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RECURSIVE DYNAMICS EMBEDDED IN THE CORE OF EXTENDED COMPOSITIONAL PRACTICES

Cristian Morales Ossio

A portfolio of compositions and commentary submitted to
the University of Huddersfield in partial fulfilment of the
requirements for the degree of Doctor of Philosophy (PhD)

September 2019

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Abstract

Recursion is a widespread term found in varied disciplines such as computer science, mathematics, linguistics, and psychology, among others. From the sociological point of view, recursion relates to the notion of *self-organisation* first introduced by Immanuel Kant and then revised into systems theory. In music, the term has been studied to describe the *poiesis* of musical structures that refer to themselves (*self-similarity*), from their basic elements up to complex shapes such as phrases or sections. On the other hand, for many researchers in cognition, creative acts occur beyond individuals. In the frame of contemporary music, creativity has not only been seen through the composer's prism but also through the active participation of performers in the artistic process. Indeed, researchers such as Clarke, Doffman, & Lim (2013), Fitch & Heyde (2007), and Gorton & Östersjö (2016) have analysed creative collaboration in composition and emphasised recursion as a property emerging from the core of ecological societies engaging composers and performers. Yet although many composers systematically carry out collaborative works in their creative process, only a few attempts at formalising multidimensional approaches on recursion have been developed so far. This thesis presents several attempts to develop two key concepts present in various dimensions of my compositional thinking: recursion, as an operative and interactive quality; and the idea of an 'extended compositional practice', understood as a coupling system in which I carry out effective reciprocities between my individual procedures and collaborative strategies. The portfolio I present in tandem with this commentary divides into two clusters of pieces representing two diverse perspectives on recursion in my processes: systemic and performative approaches. This proposal supplies novel views about ways that the musical composition can extend its traditional domains into systematic creative-collaborations by adopting recursion as a catalyser of material and human interactions. I also provide thoughts about the role of improvisation and technologies, the nature of musical material, and introduce some initial stage to imagine possible interdisciplinary applications.

Keywords: recursion, compositional practice, system, performer, creative collaboration.

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This thesis is dedicated to my beloved family: Violeta, Gabriel, Cristóbal, and Paola; my parents Leonor and Lorenzo; and to the memory of Nilda.

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PORTFOLIO

IMPORTANT: all recordings, scores, and videos of these works can be found at:

<https://www.moralesossio-composer.com/thesis-works>

Relief VI (2015/16). Work in progress. The current score presents the first period of the piece. Current duration: 3'. The first version (2011) is a seven-minute piece which is presented as a trial in this thesis (see Chapter 2).

Estudios automáticos (2016/19) [*Estudio 1, 2, and 3*], *Études* for undetermined instrumentation. Duration: 7'43". Initiated in 2016, this project includes a suite of three short compositional studies composed through computational procedures (Computer Aid Composition in OpenMusic). Three of them have been completed so far which are presented as examples of my formalised methods. Recorded with virtual instruments.

Group 1 (Chapter 3)

Matters of fact (2015/16), for tenor Helder recorder and guitar. Duration: 8'45". Recorded by Paola Muñoz, recorder, and Diego Castro, guitar. CD *Matters of fact*, by Paola Muñoz (<http://flautadulcecontemporanea.com/publicaciones.php>)

Tragic Duet (2017), for flute and recorder. Duration: 16'32". Premiered on 15th November 2017 at GAM Hall, 27th Contemporary Music Festival of Universidad Católica de Chile, Santiago de Chile. Duo Movimiento Paralelo (Karina Fischer, flute; Paola Muñoz, recorder). CD "Movimiento paralelo", 2019. (<http://flautadulcecontemporanea.com/publicaciones.php>)

Tacto (2016/17), for viola. Duration: 19'13". Premiered on 16th January 2017 at St Paul's Hall. Garth Knox, viola

Elogio de las cosas vacías (2017), for flute, oboe soloist, percussion, piano and cello. Duration: 11'35". Premiered on 26th September 2017 at Schwankhalle, Bremen. Other performances: 29th September 2017 at Universidad Nacional de Quilmes, Buenos Aires. Argentina; 6th October 2017 at Universidad de La Serena. Chile; 10th October 2017 at SCD Bellavista Hall, Santiago de Chile; 13th October 2017 at Alfred Schnitke Akademie International, Hamburg; 14th October at Kulturnhalle, Leipzig. Ensemble New Babylon

Viaje al cielo de Occidente (2017/18), for accordion and electronics. Duration: 10'37". Premiered on 18th February 2018 at St Paul's Hall. Teodoro Anzellotti, accordion; Cristian Morales Ossio, electronics

Group 2 (Chapter 4)

Eleven fragments (2016), for 3 instruments and improviser(s). Duration: undetermined (usually 19 minutes). Premiered on 19th May 2016 at Teatro Arsenale, Milan. MDI Ensemble (string trio); Evan Parker, soprano saxophone; Matteo Pennese, cornet; Walter Prati, electronics. Other performances: November 2016 at Centro Gabriela Mistral, Santiago de Chile. Taller de Música Contemporánea (string trio) Diego Castro Magas (guitar), and Benjamín Vergara (trumpet) 3rd December 2016 at Teatro Arsenale, Milan. MDI Ensemble (string trio); Giancarlo Schiaffini, trombone; Walter Prati, electronics. 27th February 2018 at St Paul's Hall by DriftEnsemble

Dinámica destructiva (2017), for bass clarinet and live electronics. Duration: undetermined (ca. 20'). Premiered on 18th June 2019 at St Paul's Hall, Huddersfield. Chiara Percivati, bass clarinet; Cristian Morales Ossio, electronics

Different surfaces (2017), for female voice, (optional) melodic instrument, and/or electronics. Duration: undetermined (ca. 7'10"). Premiered on 18th June 2019 at St Paul's Hall, Huddersfield. DriftEnsemble

Other pieces composed during the PhD

Segments/Microscopy (2018), for four musicians. Duration: undetermined (usually 16'30 minutes). Premiered on 9th March 2018 at the Chapel Larkin building, University of Hull, by DriftEnsemble. Premiered in Chile in November 2018 at Festival de Música Contemporánea Universidad Católica de Chile. Aula Magna, Casa Central Universidad Católica.

Draft for extinct birds (2017), for contrabass clarinet. In collaboration with Chilean clarinetist Álvaro Zegers. Duration: 5'35". Premiered on 16th June 2017 at the Estudio Raspail, Paris. Álvaro Zegers, contrabass clarinet.

(Total duration: 2:26:00)

INTRODUCTION

Until 2014 approximately the foundational concepts that I deal with in this dissertation were addressed in a non-integrative way: the notions of system and collaboration remained in two separate lanes in my composition practice. In a general sense, the idea of system—involving an array of terms such as randomness, emergence, recursion, among others—and the notion of collaboration—involving creativity, improvisation, and musical material—appear as two contrasting poles within the musical explorations of my earlier pieces. On the one hand, I have been strongly influenced by post-serial music, which encouraged me to elaborate compositional systems, most of them being formalised by computational means. On the other hand, my collaborative experience with different musicians has entailed not only the mere necessity of rehearsing for specific performances, but also working on notational aspects and, more importantly, on the emergence of new inputs for my imagination coming from accidental situations, common expectations between participants, and the spontaneous creativity of performers. Thus, systematised processes and collaborative work—both fed by experience as an improviser—are two common facets of my whole production. However, this double experience of manipulating/performing musical material on different plans contains fundamental questions that recall the social dimension of music. The necessity of sharing my imagination; the systemic nature of my music and its relations with metaphorical motivations; and my wish to organise and experience shared creative processes, have led me to conceive ‘conciliatory’ connections concerning individualistic and communal creative habits.

In most of my recent compositional activities, I have tried to formalise methods to consider the active musical creativity of composer/performer interactions as an emerging matter for composition adequately. From my perspective, in most cases, the search for exciting sounds and special techniques that performers can propose to composers is only the standard surface resulting from interactions in collaborations. In this framework, my opening research questions have arisen from literature coming from the constellation of theories of cognition evolved since the 1950s. A determining factor in my research has

been my ability to realise in which ways such perspectives have influenced recent analysis on collaborative dynamics in contemporary music. To systematise a personal practice, this landscape has driven me to make observations on my doing in which I have not addressed collaboration as a separate activity but as a systemic need. Consequently, rather than considering collaboration as a particular stage in the performative process, and also as an optional activity in the compositional work, I assume collaborative procedures as pivotal components within an 'extended compositional system'. The origin of the current research returns into pieces composed before 2015¹. Back then, collaborative approaches involved creative routines with musicians, consisting of improvisations on either written material or orally communicated guidelines. Most of the outcomes that I obtained from such experiences were recorded, transcribed, analysed and then re-composed by means of particular compositional tools, computationally programmed or simply by traditional ways: I began to imagine the systematisation of these procedures.

This systematisation of interactive processes has become the foundation for my formulation of recursion as the key concept at the core of my compositional practice. The term has been defined in computer science, linguistics, and sociology, among other disciplines. Its usage frequently engages notions of iteration, which is not necessarily understood as repetition, and self-generation, an emergent feature of recursive processes. For most disciplines, the concept can be understood as “[...] a property of some systems of rules by which the result of applying a rule is used again to undergo the same rule or another related rule [...]” (Pareyon, 2011, p.94). For Pinker & Jackendoff (2005) recursion “[...] refers to a procedure that calls itself, or to a constituent that contains a constituent of the same kind” (p. 203). The concepts that these authors have pointed out have resonated with my investigations, as the constructions resulting from a recursive process in my compositions can also refer to constituents of the same *kind* and not necessarily to the *same* constituents. I think that one of the most essential qualities I

¹ For instance,

- *Relief III* <https://soundcloud.com/cmoralesossio/relief3>
- *Relief V* <https://soundcloud.com/cmoralesossio/relief5>
- *Derogar el azar* <https://soundcloud.com/cmoralesossio/derogar-el-azar>
- *Relief VI* <https://soundcloud.com/cmoralesossio/relief6>

have developed in the music I present in my portfolio is a sense of repetition based on iteration, where recurrent elements would be similar in categories they belong to, rather than the repetition of the same elements. However, in tandem with this structural and linguistic approach, the notion of recursion that I have employed in my recent pieces attempts to expand its definitions into various dimensions such as the social fact implicit in collaborative works, specifically the interactive facets between composer, performer, and computer. Recursion, as a catalyser of such interactions, has allowed me to configure what I have called an 'extended compositional practice'. In this comprehensive method, conventional practices of composition combine with creative collaboration of performers. These actions aim to accord shared sense of musical writing that appears in two dimensions: the music writing as a generative process printed on the score and, notably, as an 'engraving' act performed by musicians over their instruments. Therefore, recursion, as a needed quality of a system, remains at the core of an integrative model pointing to organise transformative devices emerging across constant and organic relationships between participants.

In my workspace, collaboration is an essential term that has allowed me to understand best both the sense and the extent of the conception of an extended compositional system. However, the term is undoubtedly a very general term used to describe a wide variety of mutual creative situations that—perhaps contradictorily—brings implications related to issues of hierarchy, authorship, the conflict concerning differences on expected results, decision-making processes, etc. Led by my own experience, I have opted to develop a perspective in which musical ideas are shared and distributed among agencies which take the form of specific tasks rather than boosting collective products.

As will be seen in the next chapters, besides interactions between humans, I have developed computational tools in the domain of the Computer-aided Composition (CAC). Even if compositional procedures have been programmed with the aim of both generating and processing musical data (rhythm, harmony, pitch material, structures, etc.) I have also manipulated the same programming tools to organise collaborations as well as to define expected results and how they might be updated over the time of the piece. In this sense, the computer is considered as another agent facilitating the

transformative circulation of musical information, so that it participates as a third agent into a triangular ecology: composer/performer/computer. Its primary role is to provide representational means for musical data to be shared between composer and performer(s). In this regard, American professor Edwin Hutchins (2000) pointed out how cognition is distributed among agents in social groups (p. 1) and emphasised the importance of *artefacts* participating inside these circulations (Hutchins, 2006, p. 378). However, beyond the ways the cognition distributes, Hutchins also stresses the importance of "[...] the elements of the cognitive system, the relations among the elements, and how cognitive processes arise from interactions among those elements" (Hutchins, 2014, p. 36). Also, Michaelian & Sutton highlight how distributive processes can occur "[...] both within neural networks and across bodies, artifacts, and social groups" (Michaelian & Sutton, 2013, p. 5). An essential source to understand the problem of distributed cognition was the concept of extended mind and "active externalism" developed by Clark & Chalmers (1998). These authors explained the natural attitude of humans to recruit external support through different devices—or artefacts—such as nautical instruments, pen and paper, book, maps, computers, etc. and ways in which "[...] the human organism is linked with an external entity in a two-way interaction, creating a coupled system [...]" (p. 50). But, according to Hutchins (1995), apart from the distributive property and the coordination of internal/external elements, a third aspect to consider in any cognitive process studied in the "wild" is that distribution occurs through time, and outcomes from earlier events can transform later facts.

My recent research can be described as a doubly attempt to, primarily, create a methodological approach in my compositional space, and, secondly to frame my practice within umbrella theoretical approaches, which are helpful in decoding some 'foreign' concepts that ramble on my compositional ground. This can describe how certain vocabularies have become key concepts in the last four years, playing within the operative domain of composition and also over the terrain of human interactions. In fact, the entire set of concepts that I deal with in both my research and practice comprise ideas and resonances drawn from sociology, biology, computer science, chaos and complexity theories, and post-modern philosophies. Hence, the observation of intersecting knowledge in the core of my practice has been an actual need in my research;

a conceptual background has led me to make inferences related to the specific domain of composition. As the illustration below shows, overlapped spheres of knowledge, involving concepts such as collaboration, improvisation, randomness, systematisation, emergence and material agency—as segments comprehensively held/related together—are integrated into a generalised system having creativity as a common platform. The musical writing is located at the centre of a global system, as a point of confluence of sociological and sociocultural² studies, cognitive science, and contemporary music musicology. The whole is viewed from the Complex Thought perspective, a broader vision of complexity³ developed by French philosopher Edgar Morin. In this scheme, however, recursion appears as an all-encompassing term that, as I will analyse further in this thesis, plays a crucial role in my practice.

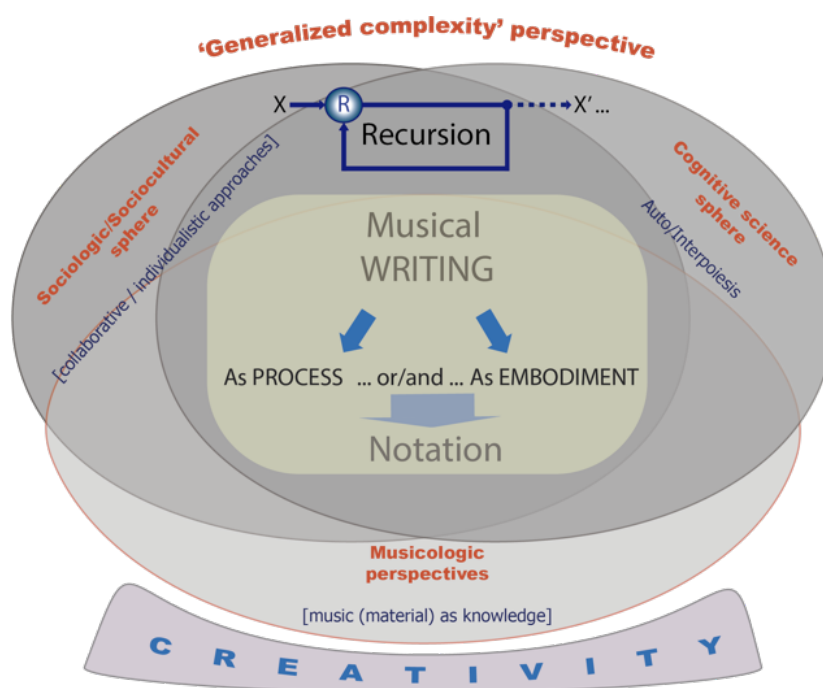


Illustration 1. Overlapped perspectives

Musical writing is viewed as the core of an overlapped perspectives system. While 'Generalized complexity' is the broadest perspective, creativity is the base of collaborative experiences between composer and performer(s). Recursion, as principal phenomenon addressed in this research, appears as an 'ubiquitous' concept.

² Although sociocultural theory is considered as a psychology emerging theory, I have jointed it with a sociological perspective as they are both related to interactions between the individual and the social. In this work, psychological aspects are included and discussed in the cognitive sciences domain.

³ Even if I hold on to the concepts and aesthetics of the well-known New Complexity, the term complexity is used here in the cognitive sense developed by Edgar Morin, especially in his treatise *Method* (Morin, 1992).

Although collaborative concepts in my workspace have been vital, my principal reflections have been focused on, first, how my own imagination can be creatively assimilated through shaping actions by performers and, second, how these performative outcomes can affect relevant aspects in the compositional process. In my attempt at extending my operative ground, both ways have been unified into a sole circular process. As a result of such reflections on how circular properties work in the frame of creative-collaborations, I opted to use recursion as the best term to describe features occurring in both social interactions and formalised-by-computer procedures.

While relevant questions are implicit in my practice, and that practice itself can potentially illuminate most of them, a transdisciplinary approach might clarify other inquiries. To what extent can my work as a composer relate to social practice without necessarily going into collective composition? How might musicians' responses to certain musical demands be reflected in my compositional systems? or, how might composer/performer interactions resist the ephemerality of improvisation through writing processes? These opening questions have also underlying interrogations about the nature and origin of my musical materials. For instance, how influential, in terms of form, can these materials be? Beyond mere communicatory function, what is the final role of a score conceived in such a context? If most of my materials arise as if in real-time, can I create processes simulating their spontaneity through the writing process? In such a scenario, what is the role of randomness? And finally, what roles can technology play in this process? Can computers be seen to have agency in a social-creative system? Which is the form that a formalised collaborative/creative work adopts into a compositional process? What kind of aesthetic implications would a project of this nature bring?

During the last four years, I have composed works that I have clustered into two large groups. In the first I have placed works mostly conceived through conventional notation and, in the second, pieces that adopt special notations and instructional (suggestive) aspects. In the first group, recursion is presented as a principle that generates material through a combination of computational and collaborative means. In the second group, the recursion is embedded in the performance work: either the performer's actions (understood as inputs) or the idealistic process that the piece depicts can be considered

as recursive—or as ‘resulting from recursion’. As presented, I introduce the term in different facets in this thesis: feedback loops, re-entry, and self-reference, and iterative operations might best describe particular applications and/or expressions of the term in my works. A significant distinction between the two groups of pieces of my portfolio is first characterised by the explicitness of the term in the systemic perspective represented by the first cluster of pieces and the implicitness that the performative approach shows.

This research aims to show how the concept of recursion has been musically applied in my composition practice. I seek to analyse abstract and concrete developments in which the role of recursion is fundamental to the conception of my pieces. Moreover, I aim to establish the starting points for further elaborations of the model I wish to configure, the one that integrates recursion into creative-collaboration routines with performers. Another goal of my research is to explain how computational means acts at the formalisation of a whole system. In doing so, I consider the concept of distributed creativity, which is another relevant element, embedded in my practice appearing with different forms and methods in the two categories of pieces presented in my portfolio. I also aim to articulate the aesthetic implications of my musical experimentation by considering at least three sources: a) my own imagery which, in generative terms, is shared (distributed) with a performer(s); b) the physical experience with musical material (free improvisations and ‘filtered’ material as the first steps of the process); and c) recursive interactions between these linked actions.

Chapter contents

Chapter 1 starts by discussing and drawing preliminary conclusions about Italian composer Luigi Nono’s collaborative practice since 1965 as an inspiring model. The main goal of this chapter, however, is to introduce the particular meaning of recursion as a property of systems, and to show the forms that recursion adopts in both creative and performative processes, and the aesthetic consequences that appear therein. I provide approaches coming from different disciplines to then bring the discussion into specific musical concerns by commenting on examples of recursive patterns. I close this section by discussing various technical and aesthetic applications of recursion in my work. The

chapter ends by explaining two aspects of my general method: computational means, which I illustrate by analysing computational tools I programmed for the work in progress *Estudios Automáticos* (2016/19); and the collaborative aspect of my process in which I work towards establishing a theoretical framework for my explorations.

Chapter 2 deals with concerns emerging from the composition of *Relief VI* (2015/16), for guitar, a work in progress, whose experience of the first version was the starting point for the ideas I have tried to carry out in this thesis. In this chapter, I present the background that supports both the construction itself and the collaborative work understood as a shared creative practice, implying an ecological facet of the piece. I also examine similarities with *Kurze Schatten II* (1983/89) by Brian Ferneyhough; composing by layers and notions of fragmentation and temporality. However, the main goal of this analysis is to deduce relevant conclusions on recursion when present in the piece's composition which has helped me to advance towards a systemic approach to term.

Chapter 3 shows an exhaustive implementation of concepts of recursion embedded in an extended compositional practice by observing two cases: *Matters of fact* (2015/16), and *Tragic duet* (2017). I analyse in details aspects such as the stages that articulate the processes, modes of collaboration, tensions between fixed material and uncertainty, interactions between musical materials, and how recursive patterns work from a larger structural perspective. In this chapter I examine other works such as *Tacto* (2016/17), *Elogio de las cosas vacías* (2017), and *Viaje al cielo de Occidente* (2017/18) where recursion is present in more subjective forms. The ensemble of pieces presented in this chapter makes up the first cluster of pieces of my portfolio.

Chapter 4 presents the second group of pieces in my portfolio. I examine how I integrate recursion as both a 'function of the music' and as sounding processes. I also seek to explain how recursion appears as an embodied process led by performers, and their engagement in shaping activities from which they obtain important identities related to their own creative skills. A first attempt in developing this concept was *Eleven fragments* (2011), where the relation between fixed/unfixed material takes place in the performance. Two significant experiments in this phase are *Dinámica destructiva* (2017)

and *Different surfaces* (2017). While in the former I explore notational means oriented to deal with recursive parametric articulations, in the latter, I draw up more open notations with iterative actions that are executed by performers.

In Chapter 5, “New horizons in my work. Final thoughts”, I provide final considerations on the experience of dealing with the concept of recursion in my workspace. I emphasise the critical role of improvisation and also the usage of technologies in the development of my practice. Another important conclusion involves considerations of the aesthetic implications that recursive interactions between materials and humans can bring, as well as a very personal perspective on the musical features configuring aesthetic such consequences.

1 Decoding concepts in my workspace

Albèra : Pour vous, faire, communiquer, vivre l'expérience de la création, est plus important qu'aboutir à une forme fixée... [For you, is doing, communicating, living the experience of creation, more important than reaching a fixed form?]

Nono : Absolument ! Le grand amour, aussi bien physique qu'intellectuel, existe dans le moment du travail, de l'étude, dans les erreurs que l'on fait et où l'on découvre des choses fantastiques. Ensuite, l'intérêt est lié aux possibilités de changer encore quelque chose. Et puis, il faut abandonner tout cela, peut-être d'une façon un peu brutale, pour d'autres étoiles polaires. [Absolutely! The great love, physical as well as intellectual, exists in the moment of work, of study, in the mistakes we make and where we discover amazing things. Then, the interest is in the possibilities of changing yet something else. Subsequently, one must abandon all of that, in a rather brutal way, for other polar stars.]⁴ (Albèra, 1997, p. 97).

1.1 Collaboration as a process

Working with others and then going into personal routines, being open to changes and new approaches on the nature of musical materials, and imagining new possibilities through interactive experiences, are, for me, some of the most fascinating facets of musical creativity. The inspiring epigraph above reveals crucial thoughts concerning my own workspace which resonate with my idea of extended compositional practices. It is in this sense that I have examined ways to embrace collaborative methods and taken into account discoveries emerging from physicality, personal reflections, complementarity and interaction among musicians, 'mistakes', shared musical inventions, and the transformative decisions collectively made at any time.

The concepts listed above outline not only collaboration-based works composed in the second half of the 20th century but also suggest aesthetic implications. The series of pieces titled *Sequenza* (1958–2004), by Luciano Berio, is a good example of this kind of practice. Berio worked collaboratively with specific musicians producing scores that may expose, among other elements, a performer's 'traces' in the new instrumental techniques and notational decisions. In this respect, musicologist Ivanka Stoianova (1985) states that the writing process in *Sequenza III* for female voice (Berio, 1968), for instance, involved consent and collaboration from Cathy Berberian as 'voice donor', to then editing textures and isolating expressions, and inventing a unifying relationship within the

⁴ Epigraph translated by Amy Stoyko for this thesis.

composition (p. 65). Relatedly, but seen from a distinct perspective, collaborative experiences developed by Venetian composer Luigi Nono between 1965 and 1989—many of them realised at the Studio di Fonologia of Milan—suggest more profound questions about the different collaborative facets explored in his work:

1. Since the composition of both *A floresta é jovem e cheja de vida* (1965–1966), for soprano, three voices of actors, clarinet in Sib, plates and magnetic tapes (Nono, 2000), and *Contrappunto dialettico alla mente* (1967–1968), for magnetic tape (Nono, 1988), Italian composer Luigi Nono thought that materials contained, expressed, proposed, in themselves, some compositional principles, and they asked for other times of durations, listening, and combinational and spatial possibilities (Nono, 1993, p. 86). In the latter, Nono's indications on how to perform different forms of singing, laughing, and whispering, supported by performative-improvisational qualities of singers Liliana Poli and Kadigia Bove, configured the characteristics of the many arrangements that Nono composed in the studio. This also established the mutual origin of materials (p. 85). Similarly, in the former, the "work is modelled on the personality, on specific features of a given performer" (Rizzardi, 1999, p. 49). Indeed, *A floresta* was Nono's first piece where compositional procedures were directly related to "the reaction of the performer to suggestions" (p. 49), rather than instructions, provided by Nono; the role of the composer shifted towards more extended territories. Such reactions ultimately set up a kind of 'oral score' which allowed the resulting music to be imprinted "onto the memory of the performing group" and permitted "a number of performances equal to each other" (p. 51).
2. For Nono, this 'collective' engagement also drove him into the assumption of a renewed political understanding as well as the adoption of crucial factors acting therein. Zattra, Burleigh & Sallis (2011) said that improvisation, which implies some element of randomness and chance, marked Nono's musical creation since 1965 (p. 412). In that period, Nono detailed specific operations setting up a truly 'microsocial' system that necessarily engages spontaneity of performers with circulating musical ideas.

3. The composer, however, did not renounce his materialist perspective on music as stated at Darmstadt, in 1959:

Music as a historical presence will always be the legacy of those who consciously yield to the process of history and who, at every moment in this process, make decisions with the full clarity of their intuition and logical perception. As they sense vital needs they will open new possibilities for fundamental new structures (Nono, 1999, p. 174).

4. Technologies that Nono used in compositional processes were taken as tools at both pre-compositional and performative stages. German composer Hans Peter Haller (1999), who collaborated with Nono in the studio from 1980, explains that, beyond technical matters, the Italian composer was interested in exploring the sound output itself. In fact, within the collaborative logic, Haller often presented transformative possibilities of sounds but “[...] Nono would first of all perceive the sounds; next he would study them more thoroughly through close listening, so that later on he could integrate them as a new instrument, from this aural experience, into his composition” (p. 12).
5. Possibly, as a projection of his own attitude towards composition, Nono encouraged the active participation of performers in collaborations. As Haller (1999) pointed out, “In his imagination an abstract sound could exist, but usually he connected it with the personality of an interpreter” (p. 13).
6. One of the most remarkable shifts that Nono experienced in his practice was that the composition itself had as origin “[...] the reaction of the performer to suggestions, not prescriptions, given by the author” (Rizzardi, 1999, p. 49).
7. Contrary to the criterion of fidelity with the score, he chose specific performers to work with him “[...] rather for their ability to become independent of a strict notation in order to perform the process that carried out the compositional intention” (Rizzardi, 1999, p. 47).

This inspiring model articulates relevant principles of an extended practice of composition. The practice itself is a natural consequence of Nono’s political-ethical

background implicating a wider understanding of novelty, since, beyond individualistic approaches to creativity, collective work for Nono can be seen as a political need to open new structures and possibilities through creative collaboration. From my viewpoint, this connection between music and thought determines a crucial concern on the origin of the musical material: the ways in which the circular flow of the collective imagination may encode certain compositional principles and also how such imagination can be brought under continuous transformation in a collective environment. Nono spread stimulating creative approaches among his collaborators in his need for inviting performers to imprint their own personality on his music.

My piece *Draft for extinct birds* (2017)⁵ for solo contrabass clarinet may be a good example of capturing energies and expression from performers, as an embodiment resulting from creative collaboration based on notated/orally 'described' improvisations. The collaborative process was developed together with clarinettist Álvaro Zegers in 2017. This consisted of several sessions of imaginative explorations upon the contrabass clarinet in which I improvised different drafts and sketches which were shared with Álvaro to communicate the kind of gestures I was looking for. Then he played them, and I recorded every single fragment. Unfortunately, the one that Álvaro called 'little birds' was lost somewhere on my hard drive, and that is the origin of the title. However, I kept the sketch (*fig. 1.1*) and my colleague could recreate most of the original experience. The piece was premiered by Álvaro on 16 June 2017 at Studio Raspail in Paris, and the recording of this concert was used as the basis to write a fully notated score that mostly respects durations, dynamics, fingers, and other techniques that Álvaro used for the definitive version⁶.

⁵ Watch the video at https://www.youtube.com/watch?time_continue=4&v=SE2Oh_Wg0BM

⁶ https://553ee3d9-57cd-407a-b63f-69ccd519fe4b.filesusr.com/ugd/1cce2f_1391e71ebafd4ebb9a0048d8aaed84b5.pdf

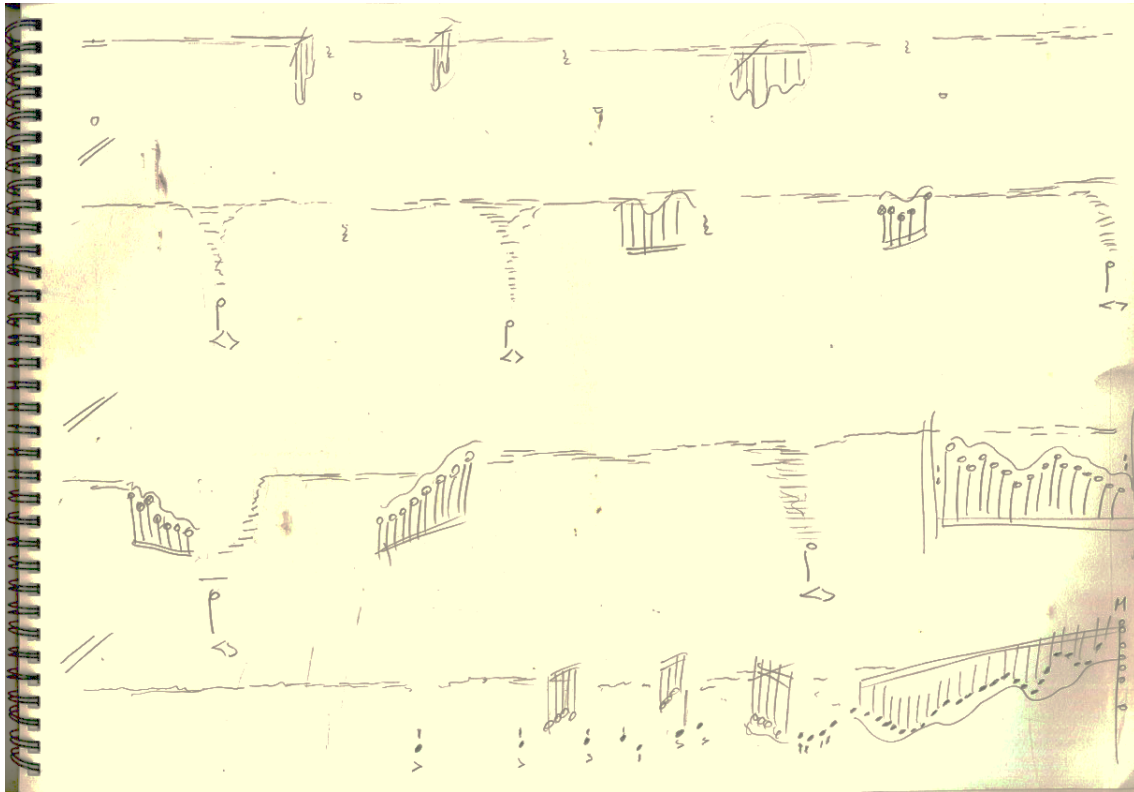


Figure 1.1. First sketch for *Draft for extinct birds* (2017), for contrabass clarinet.

1.2 Perspectives on recursion

Recursion is a transversal concept that appears in diverse disciplines in trying to elucidate how systems work. According to particular epistemologies, the meaning and sense of the concept can change to a certain extent (Corballis, 2011, p. 1). However, its use usually “[...] implies the notions of *iteration* (in contrast to *repetition*), and *self-generation* as a potential quality of a function of iteration” (Pareyon, 2011, p. 94). Thus, recursion can be seen as a special property of diverse kinds of systems, though there is not a sole manifestation of recursion nor the same elements to be analysed in all systems. For instance, we can observe how recursive properties work within the context of the well-known autopoietic model described by Chilean scientists Maturana & Varela in

Autopoiesis and Cognition: The Realization of the Living (1st edition, 1973). Sociological approaches have been developed by German sociologist Niklas Luhmann (1990) who pointed up that autopoiesis in living systems is a very specific model which cannot explain by itself how other systems work, since this would include the study of “[...] brains and machines, psychic systems and social systems, societies and short-term interactions” (p. 1). In fact, Luhmann proposed using the term ‘self-referential’ (systems) to define a more general concept of autopoiesis admitting that this kind of organization can “[...] materialize as life, but also in other modes of circularity and self-reproduction” (p. 2). Furthermore, from the systemic viewpoint, recursion can indirectly express the idea of reproducibility and, in turn, to infinite or finite sets of results. Indeed, mathematical developments in the 1930s (see Kurt Gödel and Alan Turing) established foundational principles for computer science.

In the computer science domain, ‘recursion’ has been defined by considering Kurt Gödel’s incompleteness axioms and its formalisation into an effective computational model (*Turing machine*) by Alan Turing in the 1930s. Indeed, computability is one of the most important properties of recursive functions that mathematics has recognised (Turing, 1936). The idea involved in the *Turing machine* is that of an automatic device containing rules, states and symbols (control unit); an indefinite memory (called ‘tape’); and mechanisms operating symbols on the memory (‘read/write head’). Given particular inputs, the machine holds a deterministic generative process by delivering outputs that are reinjected into the machine. A relevant property deduced from Gödel and Turing’s ideas is that of definition by induction: the definition of an output can be understood as determined for an argument by a previous result, something similar to what occurs in a Markov chain. This principle explains how recursive systems may result in complex structures like the ones studied in formal linguistics.

In mathematics, a typical example is the Fibonacci sequence, one of the most famous recursive calculations. The Italian mathematician Leonardo de Pisa (also known as Fibonacci) used the following formula to formalise the hypothetical growth of a population of rabbits. The operation is actually a re-entry system where each output is also a new input (*fig. 1.2*).

$$X_t = X_{t-1} + X_{t-2}$$

Where the nth term (X_t) is defined by the sum of the previous two.

The two initial values are:

$$X_0 = 1 ; X_1 = 1$$

The Fibonacci sequence is:

$$1, 1, 2, 3, 5, 8, 13, 21, 34, 55, \dots$$

Figure 1.2. Fibonacci's formula

In linguistics, the term has been studied as property of systems that generates syntactic structures (Pareyon, 2011, p. 94). These systems hold organised rules whose repetitive application produces results that are reintegrated into the procedure.

But from a social approach, recursion relies on self-organisation as coordinative actions between agents to deal with tensions between conventional rules and more flexible approaches to reality. In music, self-organisation can be seen as a dialogical need of sharing material through an ecological framework, where recursive patterns can have a recycling connotation. In music, this fact is assumed from the practice itself: self-organisation suggests self-similarity of agents (in terms of mutual identification within a net of relationships) and self-reference of materials (in compositional terms).

In my research, I realised that the scope of the concept of recursion seems to be very specific in technical terms—computer science and linguistics—and very general in describing social systems or dynamic systems. Using the term in music is usually quite confusing; many authors speak of recursion to refer only to repetition or recurrence. In this way, my purpose is not to contribute with a definitive definition in using recursion from analytic or creative perspectives, but, at least, to try to differentiate the different categories that the term involves according to different studies. For example, in my practice, I have adopted the computer science perspective that points out that recursion is a problem-solving procedure that calls itself, and this involves several smaller internal instances in a system that solve particular issues. Loop, feedback, self-reference, and re-

entry, on the other hand, are used here as four distinct types of recursion (Kauffman, 1987, p. 53). From a more general perspective, I use the terms ‘circularity’ (a more intuitive concept) and ‘recursiveness’ to describe “[...] the potentiality of a set of rules that are organized by themselves throughout their own iteration” (Pareyon, 2011, p. 96).

1.2.1 Aesthetic implications. Compositional/performative perspective

In music, the idea of recursion entangles repetition, texture, surface, patterns, and static and evolutive structures. From the very beginning of Western polyphony, repetition has been the gestural paradigm of many composers. Pérotin’s (*fl.* c. 1200) four-voice organa (see *Viderunt omnes* and *Sederunt principes*, for instance)⁷ reveals a deliberate trend to reiterate both micro and macro structures resulting in a type of self-referred music. Nevertheless, it is not only the musical result itself—the sounding matter—that one can immediately perceive, but also a unique compositional gesture of recurrent operations. This phenomenological viewpoint can also be found in composer Bryn Harrison’s perspective: “[...] the sequence of unchanging (or only slightly differencing events) begins to take on a life of its own, becoming almost larger than the sum of its parts” (Harrison, 2007, p. 5). By taking Morton Feldman’s music as an example, Harrison stresses that long-term repetitions can change our aural experience creating an “accumulative effect” (p. 5) what Austrian composer Bernhard Lang has defined as a “rotating disk” (p. 1) that involves new dimensions. Remarkably, in Lang’s piece, *DW 8* (2003), for orchestra and two turntable soloists, the composer superimposes two different sound supports by assigning them two opposing but interactive roles: the orchestra is intended to carry on several loops while turntables often play non-repetitive fragments acting as types of short impulses that are absorbed by the orchestra into new looping situations. As Lang (2002) himself points out, “The condition for building a loop is a Sample: a sample is something given or found, something which already exists” (p. 3). Ironically, turntables do not fully play their “rotating disc” role.

⁷ (Pérotin, & Hilliard Ensemble, 1989)

1.2.2 Compositional and performative implications

The previous examples showed outcomes resulting from particular operations over materials but also found situations and gestures; preconceived musical situations describe recursion as a phenomenon and compositional tools are intended to model it. In these cases, recursion is presented as recurrent structures and, at the same time, as sounding processes, meaning that the general musical features are shaped to sound like a real-time process.

Of course, as in many natural phenomena, repetitive behaviour in music can also be obtained by recurrent operations. As the following example shows (*fig. 1.3*), composer Thomas DeLio made a very simple recursive operation managing the density of notes per beat and, as a consequence of that, he obtained a process of stabilisation.

Figure 1.3. Thomas Delio, *Serenade* (1976).

Part I, section 10 (my own transcription from the original score). Purple numbers show the density of attacks per crotchet beat.

Piano

5 6 6 7 7 7 8 8

ppp

* Possible mistakes on the original score

(gradually up until ♯)

Density stabilisation

10 10 10 10

Rhythmic pattern stabilisation

10 10 10 10

17th quarter

PITCH material

1st cell 2nd cell

(3 1 2) (2 1 3)

(Reflection: intervallic permutation)

Piano

Every single bit of the process is supported by a 7:4 rhythmic pattern deriving complete consistency from the 17th quarter note. Pitch material is shaped in two groups of pitches, the second one being an intervallic permutation of the first one. This dimension is managed in similar statistical ways as rhythmic pattern process so that pitch sequences

gain stabilisation at the end of the thirty-four second piece by fixing pitches on both specific octaves and specific time-pattern position. As Charles Ames (1986) pointed out, “Thomas DeLio’s 1976 *Serenade* for solo piano is an elaborate work for which the form was composed manually while the details were selected automatically” (p. 179).

A representational approach to feedback loops has been worked on by French composer Tristan Murail in *Memoire/Erosion* (1976, 1997). The French horn as the soloist in an ensemble of nine instruments releases notes that the ensemble imitates, simulating an analogical reinjection loop. In this process, a unique tape is sequentially played and recorded, which deteriorates the sound into noise progressively. The ensemble also simulates the distorted sound.

But recursion is not only a quality appearing in compositional processes. As a paradigmatic phenomenon, it has also been an ideal of possible sounding behaviours. The classic *I Am Sitting in a Room* (1969), by Alvin Lucier, is a good example where, beyond its theatrical facet, the piece presents a slow but clear sounding process resulting from a looping record system which transforms the sound according to accumulative resonances of itself over time (Lucier, 1980, 2004).

Italian composer Agostino Di Scipio has composed several pieces where the concept of the loop as a recursive pattern has been used to technically implement a special musical dynamic. His implementations require sophisticated computational mechanisms involving real-time interactions that rely on setting up information exchanges between humans and machines within a sort of ecosystem. The sought situation is that of an agent sending information to computational algorithms that process it, defining an output. The model has an implicit “[...] recursive element, namely a loop between the output sound and the agent-performer [...]” (Di Scipio, 2003, p. 270). The chain that articulates such a feedback system circularly links a performer with control devices, digital sound processing units (DSP), monitor display, and sound. According to Di Scipio (2003), “The performer is first the initiator agent of the computer’s reaction, and only secondly, and indeed optionally, might become the very *locus* of feedback, injecting some noise into the overall system loop” (p. 270). In *Modes of Interference 3* (2007), Di Scipio implements

a 'composed' dynamical system based on audio feedback loop. In January 2015, I had the opportunity to perform this piece together with Taller Ciclo, a Chilean experimental ensemble. Following the model that Di Scipio exposes, the piece composes a situation where performers activate a sound feedback system by using electric guitars to approach a combo amplifier. The first action is the first information that the system receives. Computer and DSP patches act as a 'control device' that "dynamically adapts the feedback gain, trying to keep the overall system in equilibrium and avoiding sustained saturation" (Di Scipio, 2007, p. 3). In turn, the device releases a transformed sound which enters the system again.



Figure 1.4. Performance of Modes of Interference 3 (2007), by Agostino Di Scipio.

*Cristian Morales Ossio and Nicolás Kliwadenko, electric guitars; Taller Ciclo, computer system.
2 January 2015, Santiago de Chile.*

1.2.3 My thoughts on recursion

When we listen intensively to a piece of music there are moments where our consciousness detaches itself from the immediate flow of events and comes to stand apart, measuring, scanning, aware of itself in a 'speculative time-space' of dimensions different from those appropriate to the musical discourse in and of itself. (Ferneyhough, 1995c, p. 43)

In both my daily life and musical practice, listening to sounds has led to a personal approach to composition and informed a starting point to imagine new structures. While the music keeps sounding, my own perception is interrupted by imaginative flashes: a

mental counterpoint is randomly constructed. Once I leave the first flash behind and return to the listening, the present contemplative moment is somehow conditioned by the previous experience: interactions between imagination and the external sounds create updated attention in my mind. This is why I believe that my personal approach to composition is strongly attached to the listening which might be seen, from my viewpoint, as the very first musical creative act. *Figure 1.5* summarises the kind of circularity in the listening I refer to.

Listening as a creative act

(Recursiveness of the musical imagination)

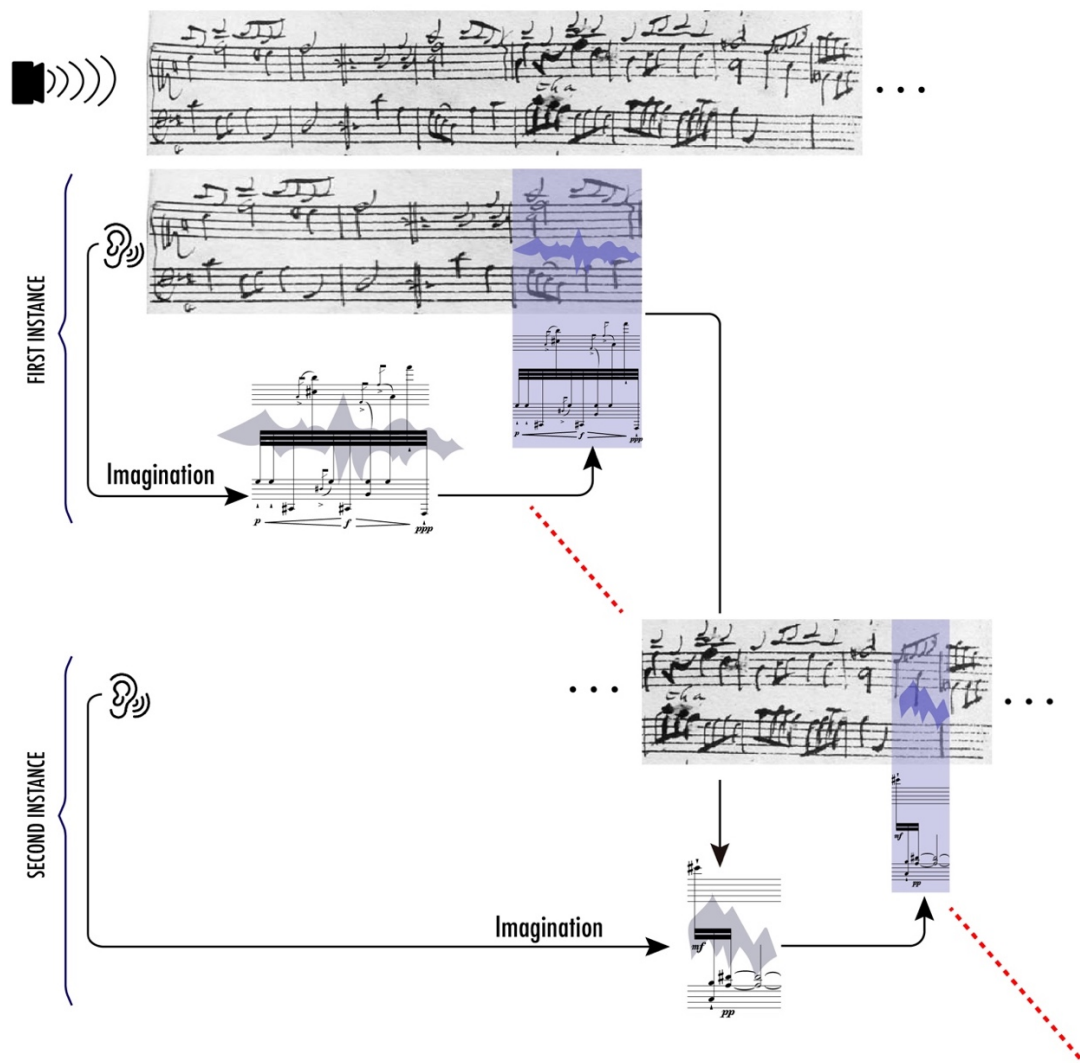


Figure 1.5. Recursiveness of the musical imagination.

Every instance corresponds to a particular moment in which the imagination and the listening interact together. The musical qualities of the happening moment depend on the previous instances of the process.

This abstract pattern shows how interactions between sounds and imagination are routed back configuring a permanent circulation. Imagination is understood as a filter modifying the listened sounds. This kind of structure has been studied by psychology of music researcher, Mark Reybrouck, who termed it an “epistemic control” (Reybrouck, 2006, p. 43) consisting of a closed-loop system inside a music user’s mind that works as an open system. Such an internal functioning could act as adaptive behaviour that circulates constantly “[...] at three levels of the epistemic control” (p. 56): “sensory inputs”, “device outputs”, and “central processing”. These allow not only the mind to interact with their outer environment but also adapt semantics and syntactics appearing at the “epistemic control system” as mental procedures (Reybrouck, 2006, p. 43). As a well-known cybernetic concept, “the epistemic control system” described by Reybrouck also “[...] allows us to conceive of the music user as an *adaptive device* going beyond the linear stimulus-reaction chain” (p. 43), which implies a certain circularity, successively reintegrating the outputs to the inputs. The whole process would allow the human mind to balance “his/her output through the flexible coordination of perception and action” (p. 43). As seen in *figure 1.5*, musical inputs are continuously managed by personal imageries, which is the “central processing” according to Reybrouck’s pattern where outputs renew the values of inputs. *Figure 1.6* summarises such a closed-loop process.

Creative listening - recursive process

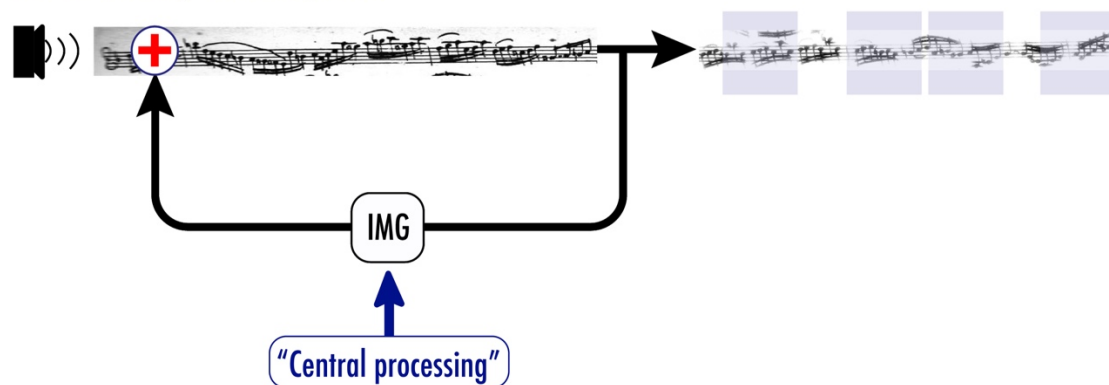


Figure 1.6. Imagination as 'central processing'.

Since my practice has systematically engaged collaborative work and sharing ideas with others, I wonder how I can bring this circular model into an integrative musical writing

method that involves not only my own imagination as a composer but also performers' creativity.

In my work, the multiple understandings of recursion have given me 'geographical' coordinates through which my compositional actions move, and also help define which elements to interact with. Since a major preoccupation in my compositional career has been about the acquisition of programming and electroacoustic knowledge, my particular approach to recursion has had, as a starting point, an operative aspect related to the cybernetic and mathematical definition of the term. Nonetheless, as I explained in the introduction of this thesis, my practice of composition brings at least three spheres of knowledge into confluence. In this way, I combine formalisation of compositional processes and social practices of music in an attempt to configure what I have termed an extended practice of composition. Thus, rather than consider only a simple programming strategy to generate musical material from symbolic logic means, such extended practice aims to integrate recursive dynamics appearing in cognitive-creative processes in social contexts.

My aesthetic approach to recursion, however, does not necessarily point to repetitive fluxes. Instead, I have developed an operational perspective which is not conditioned by the need of setting up a linear process that targets particular situations or states, simulating certain 'effects of recursion'. From my own point of view, this perspective characterises a representational approach to recursion as iteration, perhaps one of the most common ideas about the term, involving, in many cases, repetitive and/or fluctuating rhythmic patterns and smooth harmonic progressions, among other features. While I do not reject such an aesthetic approach, repetition and its consequences do not constitute an aim in itself in my music, but a result of specific operations that materials are subjected to. On the one hand, repetition is a material state discovered throughout my writing process, and on the other hand, this involves some representational side that could be understood, in my work, as a result of the perceiving-imagining recursive mental process as explained earlier.

1.2.4 Adopting models

Musically speaking, the models of recursion that I have applied in the two groups of pieces of my portfolio have been deduced through analyses of varied musical examples, obtaining a structural mechanism from which I have done different speculations about its further development. For instance, in the well-known Guillaume de Machaut's Rondeau 14, "*Ma fin est mon commencement*"⁸, the music is subjected to a simple crab-canon (recursive) operation. It is about a closed-loop recursive path which is applied to the whole music content. While the tenor voice reads their line backwards at the end of the *rondeau*, the triplum reads the cantus backwards and the cantus moves up to read the triplum backwards. The counterpoint works perfectly in both directions. The following illustration (*fig. 1.7*) shows a single instance of the model extracted. I have taken the word 'MUSIC' to represent the musical 'constituents', to use Pinker and Jackendoff's clarity (2005).

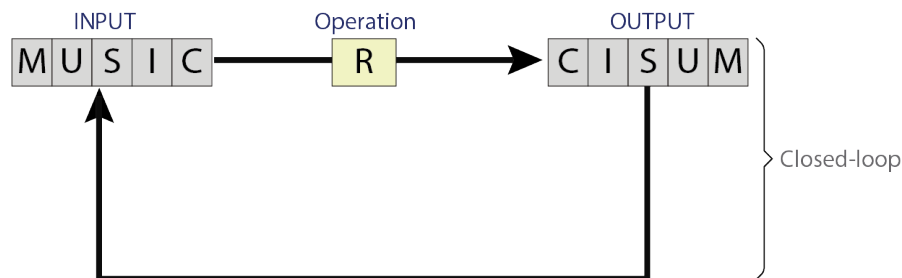


Figure 1.7. Closed-loop system, R = reverse.

But my speculations about this simple recursive model start by wondering what would happen if the operation was applied only over a few particles of the music and its result was consecutively reinjected into the same operation. The following illustration (*fig. 1.8*) shows three iterations of an imaginary recursive process whose main operation consists of randomly taking one or more constituents of 'MUSIC' to create different permutations over those particles. Then, the permutation is added to the input.

⁸ (Machaut, 1998)

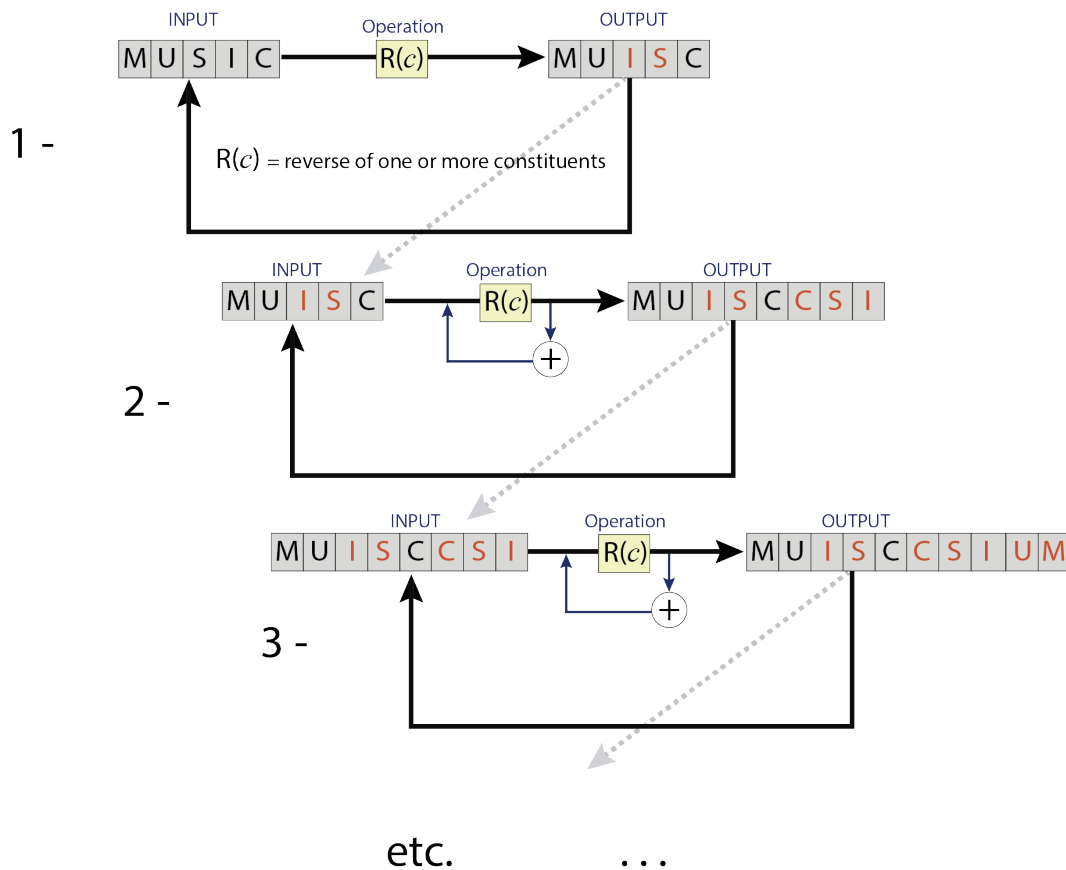


Figure 1.8. Recursive model for Group 2.

This model inspired me to compose most of the pieces of the second group in my portfolio. Rather than representing compositional procedures, the model suggested a way to implement it into a performative dimension where, though the music is consequentially transformed, original constituents also remain throughout the piece. In these pieces both performers' operations and the resultant music behave within a recursive dynamic. As will be seen in Chapter 4, this behaviour occurs as an embodiment process in performers like a learning and self-reference mechanism (see my piece *Different surfaces*, 2017, for example).

The other approach to recursion has also been developed by extending the basic idea coming from Machaut's example. Here, the procedures act over the particles of the material as well. However, the recursive model is now understood as a method of composition where two kinds of material are taking part: the musical material that I provide—which I would call 'fixed material'—and the one that emerges from creative collaborations between composer, performer, and computer. Their mutual interaction

will generate ongoing emergences. This is the recursive model that I have implemented to compose most of the pieces of the first group. The following diagram (fig. 1.9) shows the compositional process carried out by both materials. As can be seen, the particles of 'MUSIC' are spread over the whole piece ('fixed material'). Additionally, there are four collaborative situations (λ) scheduled over the time. The outcomes of these situations are defined by musical operations executed by performers who have as reference the musical content from the particles of 'MUSIC'. The scheduled interactions between those outcomes and the particles of 'MUSIC' generate new material for temporal voids (empty grey squares). The circled symbol \checkmark indicates that such interactions between 'fixed material' and collaborative outcomes have been completed. The

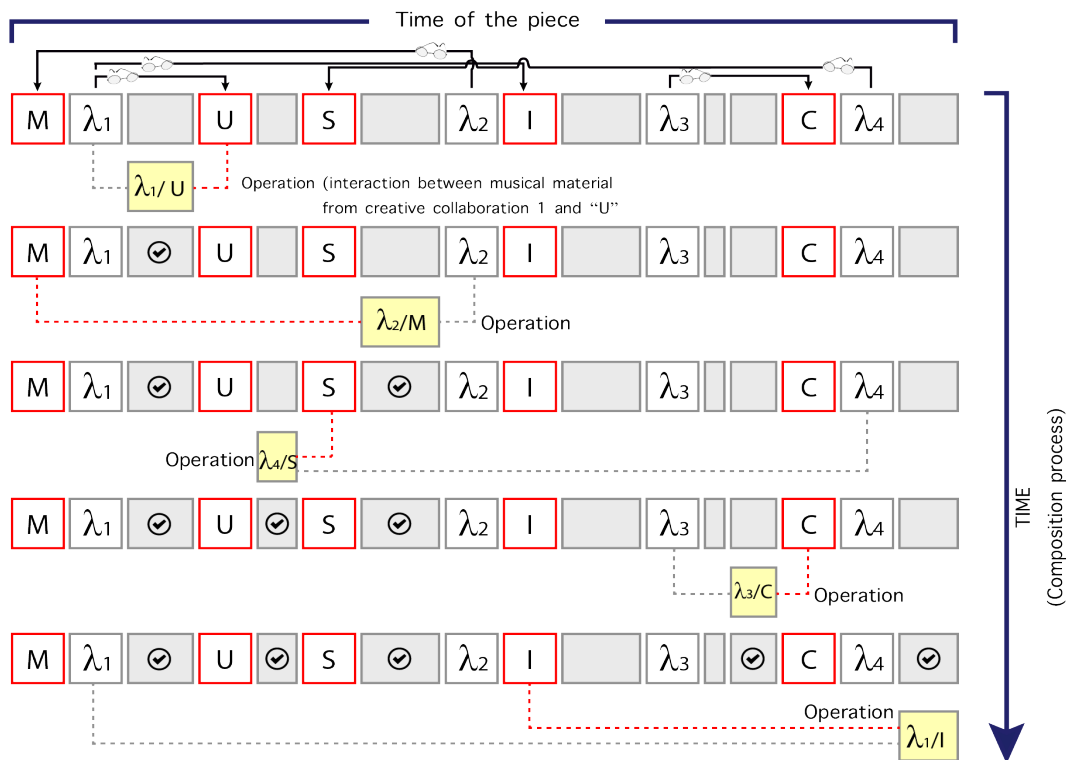


Figure 1.9. A recursive model based on interactions between musical materials.
The time of the piece is shown on the horizontal axis, whereas rows (from top to bottom) represent different instances of the compositional process.

1.3 General methods

In my workspace, two aspects are actively taking part and interacting. The computer is employed as a tool to formalise compositional procedures and organise collaborative actions. For the mere collaborative aspect, composition and instrumental creativity converge, developing a musical writing process.

1.3.1 Computational means

In the domain of Computer-Assisted Composition, I have used the computer to program various tools and compositional processes in both Common Lisp⁹ language and OpenMusic. These tools provide not only specific means to carry out generative music operations but also an environment that allows me to embrace a dialogical relationship with my materials. Since 1999, I have been programming different objects for these purposes and setting up mechanisms to interconnect them. The main tasks that this computational environment accomplishes are:

- a. Analysing recorded materials coming from improvisations or performances of specific notated fragments.
- b. Transcribing musical data delivered by analysis.
- c. Generating and transforming musical data through specific operations including either deterministic or random procedures.
- d. Creating temporal grids where time proportions are spread out. These are taken as spaces to be inhabited by different generated and transformed materials.
- e. Allocating different types of collaboration into different 'spaces' on the temporal grid.

The last point (e) is particularly relevant to my workspace and process since this shows how specific types of creative collaboration that I set up have been integrated into a

⁹ Common Lisp is a dialect of Lisp object-oriented programming. See (Steele, 1990)

formalised structure. In this way, collaborative routines articulate particular roles in the forming of the piece, and their materials are temporally moulded by the 'space' (time proportion) where they occur.

These actions are randomly scheduled over the temporal grid creating a predetermined distribution of creative tasks. Nonetheless, rather than actions intended to be executed in the performance situation, these collaborative points are embedded in the compositional process so that performers are engaged in the writing itself via interactions between their own instrumentality and musical materials that I supply. Therefore, scheduling collaborative actions over the time of the piece is in itself a compositional gesture in my workspace.

The preceding notions are closely related to my ideas about space and event, which also explain my approach to metre. Like architect Bernard Tschumi (1996) thinks, and as examined in more detail later in the *Relief VI* (2015/16) case study (see Section 2.6), space and event are equated with the notion of 'meeting points', where not only interactions between musical components that result in a fixed material occur but also indicate interaction between composer and performer(s), understood as points of distribution of creativity. These points have specific musical time measurements that restrict both the material and human interactions, a temporality that finally shapes the result. Materials and humans are forced to adjust their individual gestures to a particular temporal condition, which ultimately results in my notion of the figure. The latter inhabits a territory defined by specific dimensions that make up part of mobile identity, since the same figure (or similar) could occupy different places, according to how recursion works in specific compositional projects. This abstract perspective might be compared with Ferneyhough's thought, from the point of view of the place/time where "lines of force" and "musical energy" form musical constituents such as gesture and figure (Ferneyhough, 1995a, p. 34).

The result pursues a certain elasticity of time: the figures that are embedded in each space acquire their own tempo and express the outcomes of the interactions ("lines of force") that produced them. Thus, time contracts or stretches not only due to its ordering

meaning, “[...] as opposed to concretely present sonic entities [...]” (Ferneyhough, 1995a, p. 38), but also by the constriction or dilation of the energies of the figures that conciliate within each bar.

In most of the works presented in the first group of my portfolio, the decision regarding metre variations and temporal-qualities of the sonic energies contained in each bar comes from a constructivist attitude: particular calculations that I usually carry out through the programming of algorithms. These procedures are similar to those that I will describe in the analysis of *Estudios automáticos* (2016/19) since they had a strong influence at the construction of temporal grids in the composition process. Such computational methods consider various proportions that some given materials contain (pitch or rhythm). Thus, a single chord, for example, can project temporal correspondences if the equivalence intervals/time points are considered. Likewise, the duration proportions of a given rhythmic sequence may become a distribution of different bars of time signature.

1.3.1.1 *Estudios automáticos* (2016/19), *Estudio 1, 2, and 3*, *Études* for undetermined instrumentation; from the randomness of the machine to the randomness of the imagination

The construction of these compositional studies shows the extent of my technical inventions and an exploration on aesthetics that might be seen as distant from my own imaginary as a composer. Since a significant part of my practice involves the formalisation of musical processes, the aim at this stage of my research was to develop technical skills as well as to set up an algorithmic approach. Accordingly, I decided to establish mechanical principles to create new musical structures by bearing intuitive impulses in mind and by engaging empirical methods such as selecting excerpts and shaping musical phrases by listening to outcomes. Thus, I temporarily moved my practice towards a programming labour.

The project aimed to relate two opposite situations: improvisation, which is understood in this case as a strategy to generate a first impulse in the process, and a computational

interpretation of the material released by the first impulse. Though the aesthetic orientation is different, British composer Bryn Harrison's *Vessels* (2012), for piano, and *Receiving the Approaching Memory* (2014), for violin and piano, were a fundamental inspiration for *Estudios*. The pieces by Harrison were presented in one of his lectures¹⁰ at the University of Huddersfield. The ideas surrounding his works were particularly significant to me. First, the notion of a repeated musical object that does not change in itself, but changes experientially through the mind contemplating it (Harrison, 2013, p. 5). In fact, this is Hulme's idea quoted by Gilles Deleuze in *Difference et Répétition*, which has been assumed by Harrison as a crucial inspiration for his work. Second, the role of the imagination as involved in the relationship between difference and repetition that Deleuze has exposed in his work: "[...] repetition is itself in essence imaginary, since the imagination alone here forms the 'moment' [...]" (Deleuze, 1994, p. 76). Certainly, these two ideas engaging repetition phenomena have embodied fundamental questions and vital motivations for composing not only this study series but also developing my computational tools. The general behaviour of the music that I have imagined for these pieces releases some traits of repetition itself. My idea was to represent what occurs in my mind when I listen to explicitly repetitive music: my perception and imagination tend to distort the musical matter in various dimensions and directions so that the original features of repetition only slightly remain in my mind. Furthermore, it is important to point out that the musical results of these studies approach what I was expecting as a result from the recursive patterns I would develop in the pieces where a systemic approach was applied. Therefore, the sense of repetition in *Estudios* is the pursuit of my own recursive aesthetic which involves representations of my own cognitive processes (see Section 1.2.3).

One of the first tasks for this project was establishing a building model, which is illustrated below in *figure 1.10*.

¹⁰ The lecture took place on 9 February 2016, in the frame of *Colloquium* postgraduate series organised by the Centre for Research in New Music (CeReNeM), University of Huddersfield.

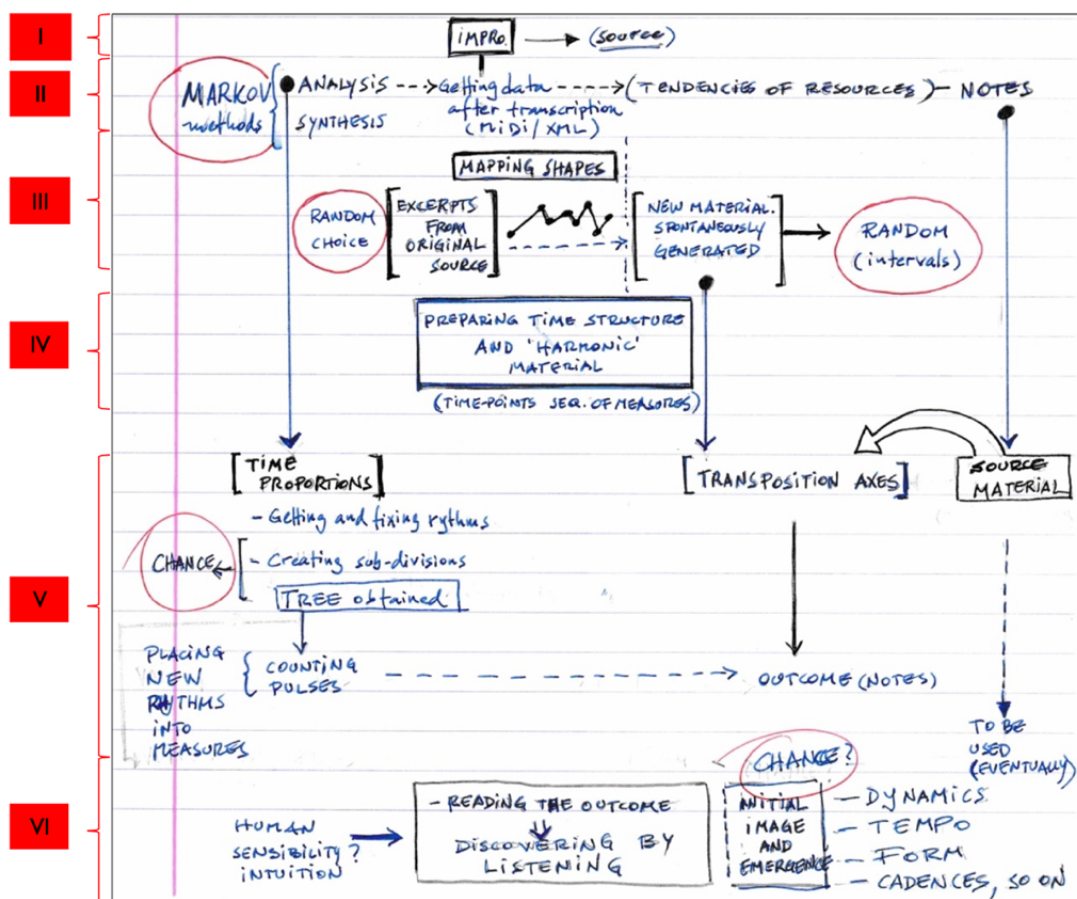


Figure 1.10. The six-step process for the computational procedure.

Estudios automáticos (2016/19).

Retrieved from my manuscripts.

The model holds six distinct stages:

- I. IMPROVISATION. The first step is the realisation of an improvisation, which will be electronically transcribed with the aim of getting a file (MIDI or XML) that can be decoded by an OpenMusic¹¹ object.
- II. ANALYSIS/SYNTHESIS. The transcription will be analysed statistically using the Markov chain method¹², which provides the needed data to create several

¹¹ Initially called PatchWork (by Mikael Laurson in 1985–86), and written in the 90s in Common Lisp at IRCAM by M. Laurson, J. Duthen, and C. Rueda, OpenMusic “is a domain-specific visual programming language designed for music composers” (Bresson & Giavitto, 2014, p. 363)

¹² “A Markov process is a probability system where the likelihood that an event will be selected is based on one or more past events. A matrix referred to as a transition table is used to show the probability that a certain event will be selected based on one or more past events.” (Simoni, 2003, at 15.4). *Markov chain* can also be implemented to analyse discrete data statistically.

versions from the material decoded in the first step. Excerpts randomly chosen will be supplied by this stage to the next one.

- III. MAPPING. The intervallic vector of the chosen excerpts is analysed, and then will be mapped on a randomly generated scale of notes. That is, the emerging scale has acquired the same melodic form as the material given by the Markov procedure.
- IV. TIME STRUCTURE AND HARMONIC MATERIAL. Once the melodic form of the scale has been obtained, time points and intervals of this new material are calculated, which will allow for the construction of a sequence of bars whose proportions are equivalent to the intervals analysed.
- V. OUTCOME. In the second stage, the Markovian analysis has already released rhythmic values that are interpreted here as TIME PROPORTIONS. With this data, two procedures will be performed: the construction of rhythmic trees, and possible (random) rhythmical sub-divisions when the procedure 'finds' only one attack in a beat. The result of this process of rhythmic formation is a succession of figures that will be placed in each of the bars that have been obtained in step IV. Similarly, in the third stage, new material has been already generated from the random scale. The notes of this material are used in this stage as TRANSPOSITION AXIS. Each of these axes will articulate a pitch-shifting operation on the source material which has originated in the Markovian synthesis. Both operations—TIME PROPORTIONS and TRANSPOSITION AXIS—converge to give a preliminary form to the emerged music.
- VI. 'READING' THE OUTCOME. At this stage, the procedures are beyond the computational mechanism itself. Analytical observations of the outcome are undertaken, either through theoretical analysis or listening. Sensation and human intuition are taking part, and the contrast between improvisation (as input), initial expectations, and the emerging material is considered.

The implementation of this staged system was done in OpenMusic to conceive a 'global function'. This can be best understood as a general mechanism whose musical outcomes vary according to both the first impulse (improvised music) the system receives and its random variables such as transposition axes and sound/silence density.

Another dimension that *Estudios automáticos* explores involves important aspects in terms of instrumentation:

- a. Though scores are written in two 'voices', the instrumentation is open;
- b. Recordings¹³ presented in my portfolio suggest resonant instruments (piano, harp, guitar, vibraphone, celesta, etc.)¹⁴
- c. Performers can explore different tunings between voices; and
- d. Dynamics, articulations, fermata, and diverse symbols can be taken as references for further and more complex instrumentation.

Therefore, *Estudios automáticos* can be seen as a found musical material to be re-composed by following these guidelines. *Estudio 1, 2* and *3* were composed by operating an algorithm that I have developed in OpenMusic. As a first trial, I recorded a very simple MIDI sequence (fig. 1.11). The process starts with this improvised material which provided musical data in two domains: pitch and time proportions.

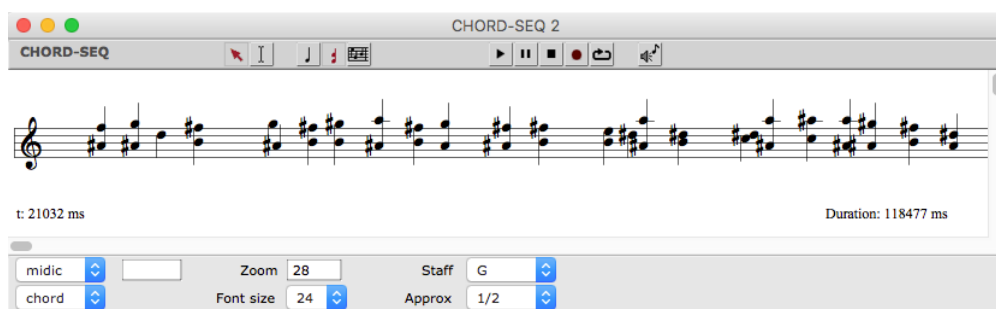


Figure 1.11. Improvised material recorded as a MIDI sequence.

As seen in this picture, the initial input is pure harmonic material which ultimately would become the one I used to compose these *études*. This is analysed through Markov chain

¹³ Virtual instruments

¹⁴ See <https://www.moralesossio-composer.com/chapter-1-audio-and-video>

methods, and then ‘re-synthesised’, creating other versions of the same input. The material was brought into a transposition process that takes randomly generated notes as transposition axis as well as its time proportions which, in the algorithm will be interpreted as the number of beats per bar. However, the implementation of the transposition process was assigned only to the upper voice whilst the lower one keeps partially the original material re-synthesised by the Markov algorithm. The construction overlaps the ‘repetition in itself’ (lower voice) and the representation of my mind (upper voice). As I have pointed out, this representation of the mind implies a sense of distortion of the musical matter. In *Estudios*, this has been treated through harmonic ‘transpositions’ as well as through ‘modulations of time’. In *Estudio 1*¹⁵, for instance, the entire piece is articulated by seven iterations of the processes described (see *fig. 1.12*). The outcome of each iteration is finally ‘filtered’ at the last stage of the model (VI), where I operate a ‘reading’ of the outcome. The latter also implies a shaping process that was carried out by myself, out of the computational environment: phrasing, articulations, dynamics, agogics, and other surfaces not provided by the algorithms were imagined to ‘polish’ the final form and expressivity of the *études*. For instance, in the particular case of *Estudio 1*, I have collected seven periods by aurally searching for some singular harmonic-temporal conditions in every last bar. For example, in bar 9 I found a confluence of slower fluxes of time—compared to previous bars—and narrow intervals (mostly seconds) which established a rule type to look for similar situation setting up other cadences. I added accents on narrow intervals in the middle register configuring a textural relief that becomes important gestural surface in the second half of the work. *Figure 1.12* shows the structure of the seven periods (iterations) of the piece and the distribution of beats for each. The notes contained within each bar are only the initial notes to operate successive transpositions.

¹⁵ For the recording and the score see: <https://www.moralesossio-composer.com/chapter-1-audio-and-video>

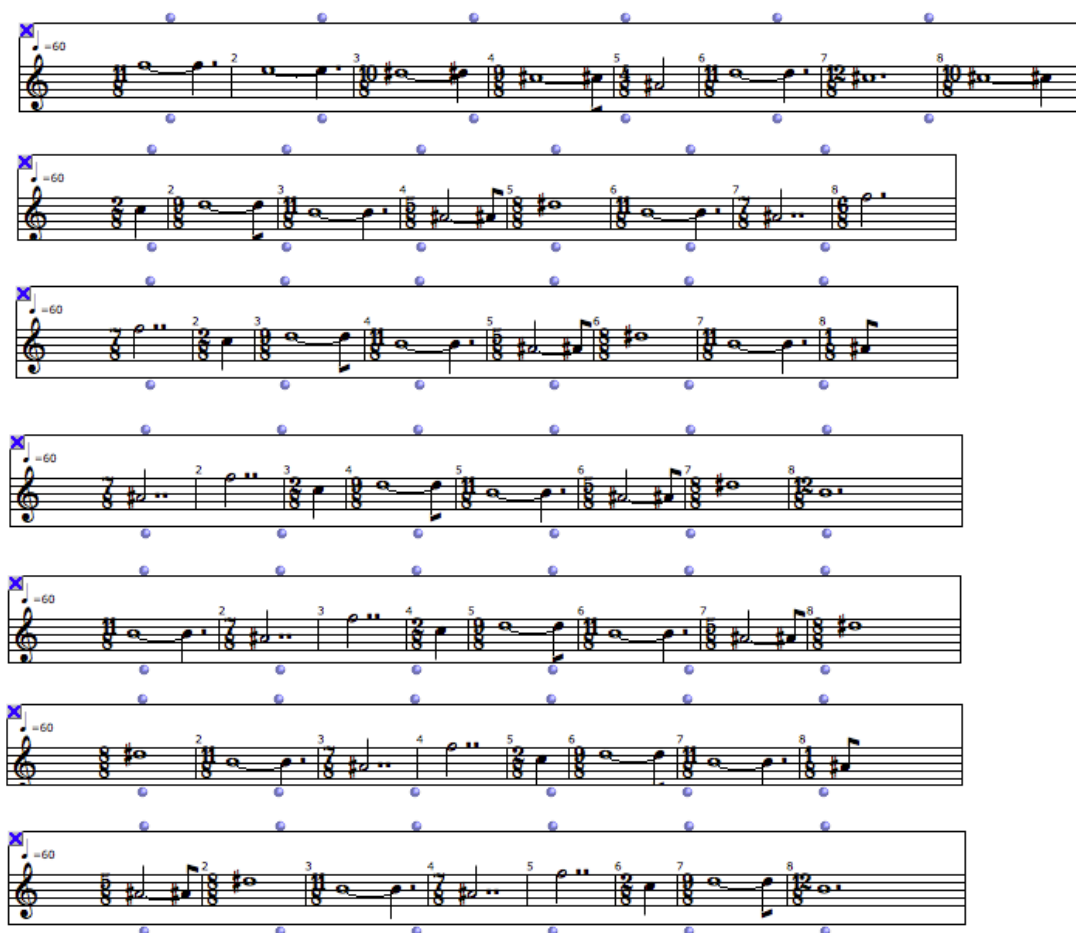


Figure 1.12. Seven iterations in Estudio 1.

1.3.2 Collaborative aspect

A number of collaborative case studies in composition have been examined from a musicological perspective. For instance, music researchers Eric Clarke and Mark Doffman (2013, 2016) have analysed collaborative processes in music by Liza Lim, and Jeremy Thurlow; Eric Clarke, Nicholas Cook, Bryn Harrison and Phillipe Thomas (2005) have worked together on a collaborative analysis of collaborative processes in Bryn Harrison's *être-temps* (2002), for piano; and Professor Amanda Bayley (2011) who has worked on the software DVD *Evolution and Collaboration: the composition, rehearsal and performance of Finnissy's Second String Quartet*. However, I will only highlight two references where composers and performers discuss together on their collaborative experiences in creative processes, namely, David Gorton and Stefan Östersjö (2016), and Fabrice Fitch and Neil Heyde (2007), and only three cases where composers examine their own work under the perspective of collaboration: Liza Lim (2013, 2017) and Richard Barrett (2002).

In my pieces *Matters of fact* (2015/16) and *Tragic duet* (2017), the collaborative work is characterised by creative participation routines. This aims not only to integrate decisions made by performers but, especially, to carry out a process of appropriation of musical materials for them to practice effective involvement in the composition itself. This ‘appropriation’ is intended to materialise within two dimensions of the composition:

1. The generation of musical material ruled by my concept of figure.
2. A particular idea of form as something to mutually build, rather than deliver/receive a pre-established pattern to assimilate from the outer.

In doing this, performers are in permanent contact with the history of musical materials since they have already manipulated them not from the interpretative viewpoint, but from their own creative abilities. Thus, throughout the recursion operation, successive outcomes from performers’ actions are reinjected into the system. Such a mechanism might be defined as a process of “distributed creativity” involving cognitive circulations among agents: “[...] cognitive processes may be distributed across the members of a social group, cognitive processes may be distributed in the sense that the operation of the cognitive system involves coordination between internal and external (material or environmental) structure, and processes may be distributed through time in such a way that the products of earlier events can transform the nature of later events” (Hutchins, 2000, pp. 1–2).

In this sense, distributive properties in a collaborative environment have led me to a deeper idea of form. According to traditional views in cognitive sciences,¹⁶ the creative act is only expected to come from individuals. In music, the genius figure is that of a composer who works alone and enclosed with no external disturbances to deliver their musical imagination printed in a score. From my viewpoint, this persistent image of genius involves an individualistic approach to the conception of the musical form that dispenses with the influences of the social interactions. According to Glăveanu (2010), the description of the old lone-creator model, or “He-paradigm”, stresses two pivot

¹⁶ Glăveanu (2010) states that, in describing a creator, the paradigm of genius has stressed two aspects: exclusivity and disconnection. (p. 80).

characteristics: “exclusivity” and “disconnection” (pp. 80–81). In this direction, creativity would entangle with both features. From the former perspective, it is stated that only a few people are called to hold creative activities, and from the latter, the paradigm implies that those few require their self-abandonment of the crowd (p. 81). As I pointed out so far, in my research the idea of form is mediated by a notion of shaping together as a process, rather than assuming pre-established schemes set up and delivered by me as a composer. In seeking the long-term form, I have found my own answer that consists of setting up (human) variables into the problem of form, whose internal dynamics (the interpreter/material relationship) help (or take part in) the ‘generativity’ and ‘recursion’. Hence, the constitution of musical forms depends on the distribution of ‘constants’ and variables. Metaphorically, this form could be understood as the action of rebuilding an earthenware vessel from its own pieces. What I have called ‘lighthouses’ (see Chapter 4) might be those reference vestiges, and the reconstructive actions of the lost form equate to the collaborative actions and the synthesis the composer carried out (as an archaeological work). Interestingly, in the composition of *Dinámica destructiva* (2017), for instance, where there was extensive collaboration with Italian clarinettist Chiara Percivati, one of the main preoccupations was that of the form, since in my imagination the long-term musical gesture came as a very diffuse thing; I was thinking of several instances of multi-interactive dynamics rather than the form of the piece. As I started the collaborative meetings with Chiara, I realised that the form of the piece should be built through the collaborative dynamics, where dialogical routines were crucial for these purposes. In this respect, Chiara wrote, “From our first attempts, I realized that it will absolutely be necessary to work extensively on the piece, on its form and structure (I stress), on its logic and on the live electronics interactions, to find solutions that can really work” (retrieved from a personal email sent on 22 June 2017).

Overall, what I try to approach might be found in the history of the ‘open form’ in music. Decisions by performers in creating a piece are not something new in contemporary music. The perspective on recursion I propose in this thesis is a quality that can be seen and analysed from both systemic and cognitive viewpoints in these kinds of works where the form is actively being created in real time but with clear ideas on how gestures and actions behave.

An interesting case in which performers' interventions have been almost algorithmically organised is Christian Wolff's music (see *For pianist*, composed in 1959¹⁷, or *For 1, 2, or 3 people*, composed in 1964¹⁸, for example). However, particularly for the purposes that this communication attempts to develop, Richard Barrett and Liza Lim's works and writings have been pivoting influences on my thought. Their engagement in thinking the role of the score as a surface where compositional ideas, strategies and notation converge and interact has shown me interesting ways to deal with my ideas about the extension of my compositional practice. For example, British composer Richard Barrett (2014) suggested new approaches to notation in relation to free improvisation and its relationship with fixed materials:

[...] my involvement with combining notation and improvisation hasn't begun from taking a notated composition as a default position and 'opening up spaces' for improvisation within it, but instead from taking free improvisation as a starting point and using notation not to restrict it but to suggest directions or possible points of focus for it [...] (p. 62)

In similar directions, Australian composer Liza Lim (2017) considers improvisation not "[...] as a type of freedom from the constraints of notation, but as an unpredictable quality *within* constraints [...]" (p. 208) where mind and body act together to respond to different situations dynamically. Furthermore, Lim also highlights the entanglement of mind and body as an "[...] emergent property of performance in time and space [...]" (p. 208) which could be framed of the multiple forms that materials behave "[...] in a tactical feedback loop of information and action [...]" (p. 208).

Undoubtedly, these perspectives have been decisive in looking for alternatives for both notation and collaborative strategies in most of my portfolio's pieces, and played a guiding role in the aim of elaborate specific procedures on recursion and speculations on creative collaboration methods.

¹⁷ (Wolff, 1965)

¹⁸ (Wolff, 1964)

2 *Relief VI*, for guitar: towards a systemic approach

2.1 Background. Visual/tactile perspective

In my series of pieces titled *Relief*, I explored different approaches to the visual/tactile idea of relief as a texture. Even if my particular textural tactics and affinities can also be found in other pieces, it is in the cycle *Relief* where I worked the concept in a more deliberate way. Like in visual arts, my idea of relief combines multi-dimensional and flat-surfaced objects which are materialized as an arrangement of energies/forces, vectors configuring shapes. In my own conception, flat surfaces are supposed to be supporting places to be occupied by different musical materials. Those places are not necessarily a textural representation of a sustained 'flat' sound like a background. Instead, I conceive it as an abstract space with specific temporal qualities produced through specific operations. On the other hand, a multi-dimensional manifestation of the material constitutes the reliefs themselves which are fitted in those inert flat surfaces. Therefore, pitch deployments, dynamic shifts, timbre modulation, and temporal qualities, among other dimensions, can be represented as energies that interact with each other resulting in shapes with emergent profiles. These shapes stress melodic or timbral characteristics, for example, at the expense of other dimensions that would remain in 'low-relief'. The involvement of silences within this idea is understood as interstitial durations in which sound inertia entangles with the current time of a listener (perhaps a type of negative relief?).

Relief VI is a compositional project (and work in progress) that also triggered a number of new works exploring significant factors. If one wanted the piece to be seen as a finished work, it would be enough to consider the first score I made in 2011¹⁹. However, that first release was only an aural sample from a much longer piece that I am still writing in

¹⁹The score for this first version can be downloaded here:
https://docs.wixstatic.com/ugd/1cce2f_5b3cf8c82c104ffcbd8b28e1d79484dd.pdf

collaboration with Chilean guitarist Diego Castro-Magas. In tandem with a general tactile approach, I highlight the following facets that participated in the origin of the piece:

- a. The combination of the instrumental layers of an initial material obtained through improvisations—physical/tactile sensation—with an abstract development.
- b. Composing by considering sound layers present in the original material and their formalisation by computational means.
- c. The meaning of improvisation in a creative collaboration environment.
- d. And especially, a first approach to recursion.

2.2 A decisive influence

Undoubtedly, a decisive source of inspiration was *Kurze Schatten II* (1983/89)²⁰, for guitar, by Brian Ferneyhough. What most fascinates me in this seven-piece suite is the supposed deconstruction of the guitar's sound nature. Ferneyhough (1995b) demonstrates special preoccupation in this aspect since he pointed out that he “wanted to modify the tuning of the instrument to produce microtonal sonorities” (p. 139). Throughout the seven pieces, the composer established a progressive transition from an initial (unusual) *scordatura* (see *fig. 2.1*) to a natural tuning “[...] in favor of the more ample and familiar sonority[...]” (p. 140): except for the second string that maintains its B \flat tuning, each string returns to its conventional pitch after each pair of movements. These changeable tunings act as a truly woven surface over which a variety of figures have been engraved following particular polyphonic ideas, density, and rhythmic choices, sounds and articulations, use of silence, formal issues, nature, among others. However, besides this decisive influence for *Relief VI*, Ferneyhough's guitar piece treasures other stimulating elements that resonated in polyphonic ways in my imagination. The idea of ‘multiple-layered’ music, for example, presented in the first movement, laid out a key trail for my intentions. The perpetual multi-articulative, timbral, and figural sounding

²⁰ (Ferneyhough, 1989)

universe carried by fuzzy rhythmic features in *Kurze Schatten II* led me to conceive a new piece as well as a reconsideration of the guitar, a meaningful instrument in my culture²¹.



Figure 2.1. Scordatura for Relief VI.
E (1) and D (4) remain on their natural tuning. B (2) became B \flat while the 3rd and 5th strings were detuned a quarter tone higher, and the 6th one a quarter tone lower.

Another central idea, also influenced by Ferneyhough's work, was determined by the fact that, in the sixth movement, the decision of allocating fingerings can be made by the performer. According to Ferneyhough (1995b), the organisation of pitches, one of the fundamental vectors of the sixth piece, has a variable dimension in that he did not indicate fingerings and "[...] it is thus up to individual players to determine if they prefer a fingering which gives them greatest possible continuity and facility in the figuration,

whilst scarifying some ‘effective’ sonorities [...]” (p. 150). The sole idea of determining pitches within movable harmonic fields established in collaboration with the performer was an essential part of the methodology of collaboration embedded in *Relief VI*. In fact, the creative-collaboration framework developed in this work served to carry out notions of figure and form restricted by diverse fingerings that we proved and compared. The absolute pitch concept, that I used to work in earlier pieces, became an absolute pitch context that can change from performer to performer according to their personal aesthetical preferences and technical possibilities, to borrow Ferneyhough’s words. Consequently, the very first notion of collaborative methodology was motivated by this essential ‘guitaristic’ practice of setting up fingerings even if, in the *Relief VI*’s case, this practice was transformed the harmonic principles, such as dissonance classes, that the original material suggested.

2.3 A rhizomatic prism

The composition of *Relief VI* has motivated the opportunity to carry out an almost ‘visceral’ impulse in my work: the necessity of going towards music whose becoming is not tied to the notion of development. Such non-narrative music is based more on the idea of multiple components that connect each other, describing organic affectations among them, than on linear connectivity on the listening experience. In general, I think of an improvised-like texture in which different relationships occur as if they were happening in real time. That structural conception not only implies shifting—and multiple—relationships among musical elements but also a ‘social’ aspect involving creative interactions among agents, namely, composer, performer, and machine.

I found stimulating resonances for these ideas in French post-structuralist philosophies. In “Rhizome”, Deleuze & Guattari (1987) attempted to describe a model of interpretation of reality based on a non-arborescent perspective. The rhizome, by contrast, refers to certain plants that grow horizontally that are mutually interconnected without having any apparent (*a priori*) hierarchical order. In this sense, authors (Deleuze & Guattari, 1987) suggest that a rhizomatic structure is akin to an environment in motion containing both dynamic and fixed disparate components connected by undefined paths. This vision

might be pictured as a meshwork of multiple non-hierarchical and ‘anti-genealogy’ points—or sites—forming, what these French philosophers called, ‘assemblages’. Connections between such points act as a networked carrier-of-information lines. Additionally, these abstract linked lines (« ligne de fuite ou de déterritorialisation ») also resonate with a certain cartography, “[...] a map that must be produced, constructed, a map that is always detachable, connectable, reversible, modifiable, and has multiple entryways and exits and its own lines of flight” (p. 22).

But, in which ways do these abstractions relate to the compositional processes in *Relief VI*? Deleuzian concepts illuminated a way of thinking about fertile structures where associations and relationships can be randomly made as Deleuze & Guattari conceived it: “[...] any point of a rhizome can be connected to anything other [...]” (p. 7). Following one of my foundational ideas for my piece *Relief VI*, I refuse any narratively written music, or, to borrow Deleuze/Guattarian concept, any “linguistic tree” constructive model based on a *dichotomic* logic. Rather, I believe that pieces I have composed since 2011 bear traces of a temporal territory sowed with rhizomatic figures presented in different states that constantly renovates through the articulation of randomly “connected/dissociated” fragments.

Of course, the idea of the rhizome has not only nourished analytical views and academic research, but it has also resonated with a variety of composers. For example, Belgian musicologist Klaas Coulembier (2016) has developed an interesting rhizome-based analytical method to distinguish major aspects of multi-temporality in Eliot Carter and Claus-Steffen Mahnkopf’s music. In the compositional sphere, Deleuze & Guattari’s *Mille Plateaux* has been an inspirational source for artists from Boulez to Claus-Steffen Mahnkopf. The five main principles of rhizome—heterogeneity, connectivity, asignifying rupture, cartography, decalcomania—have guided dissimilar aesthetical approaches that interpret them in many different ways. For instance, “In Mahnkopf’s line of thought, post-structuralism (both in music and in philosophy) stands for pluralism (in Lyotard’s sense of ‘anything goes’), while he strives for the plural, understood as multiplicity integrated into a closed (ideologically determined) structure” (Coulembier, 2016, p. 352). Boulezian approaches to Deleuze’s thought have been that of a clear trend to develop *athematicism*

as an aesthetic option that would influence a vast part of post-1950s music. As an heir to Webern's musical thought, the French composer's work represents a bridge between the serial and post-serial principle of "variation or non-repetition" and the *rhizome's* principles of 'cartography and decalcomania':

[...] a rhizome is not amenable to any structural or generative model. It is a stranger to any idea of genetic axis or deep structure. A genetic axis is like an objective pivotal unity upon which successive stages are organized; a deep structure is more like a base sequence that can be broken down into immediate constituents, while the unity of the product passes into another, transformational and subjective, dimension. (Deleuze & Guattari, 1987, p. 12)

In fact, in referring to Webern's (1965) *Op. 27 Variations for piano* (1936), Boulez (2005) underlined a notion of "idée" as an imperceptible object (theme) which the variations refer to. So that the (absent) theme—the *idée*—remains just an aura from which different images (the variations) arise by means of diverse begetting procedures. Boulez termed it as the "virtuality of a theme" (p. 225).

Complementary to these interpretations being closely focused on the level of the compositional construction, my particular approach to the *rhizome* has been that of an extended space where not only particles of musical materials affect each other but are also affected by the performer's decisions, and interactions between composer, performer and computer developed at the centre of a collaborative structure. In *Relief VI*, I have formalised a method to interrelate materials based on a particular way of combining their internal units, which have been treated as layers in the composition. The computer acts as an interpreter by articulating constructive principles in random ways, placed in the articulations of the system. This provides impulses that find a context of response into the performer's mind that acts as a kind of reverb system. These materials are then doubly embodied: first in the performer's mind and second, in the instrument as an artefact, both of them being guided by their creative participation in the compositional process. Hence, it is in this way that the rhizome's connectivity principle works in my piece: every single agent is interconnected within a complex 'social' network that includes minds, abstract materials, concrete sounds, tools, and artefacts. Such a structure has been crucial for the developments I realised later since it showed me a way to think of an open system that integrates human factors as complex variables. As will be

seen, this openness has resulted in a particular notion of version in many of my pieces: the current state of *Relief VI*, for instance, depended on Diego's engagement, but this can vary according to other creative collaborations.

2.4 Shared creativity practice: an ecological facet

My experience of the composition of *Relief VI* started in 2011 as a collaboration with guitarist Diego Castro-Magas. The compositional process began with experiments that consisted of recording improvisations that I played. My first purpose was to explore the multiple gestural possibilities that my 'non-filtered' and free improvisations gave. These actions of apparent carelessness were not thought of as a pondered strategy at all, but as an impulsive need to experience wilder—crude—relationships with the guitar as a body²². Such a 'carnal' attitude resulted in distinctive shapes which were structured by different parametric 'reliefs' and durations, the whole being ruled by my own 'clumsiness' on the guitar: fast passages, percussive sounds and articulations, diverse tunings, etc. I would say that a major poetic end was to obtain an extensive sound-structural complexity appearing as tangential effects of such (unintentional) impureness. The first actions concerning results of my improvisational approach drove me to select a specific fragment of music and its subsequent transcription into musical notation, so that the concrete recorded material (*fig. 2.2*) became an abstract input for further compositional usages. The next illustration shows the transcription that I made from such a germinal material²³.

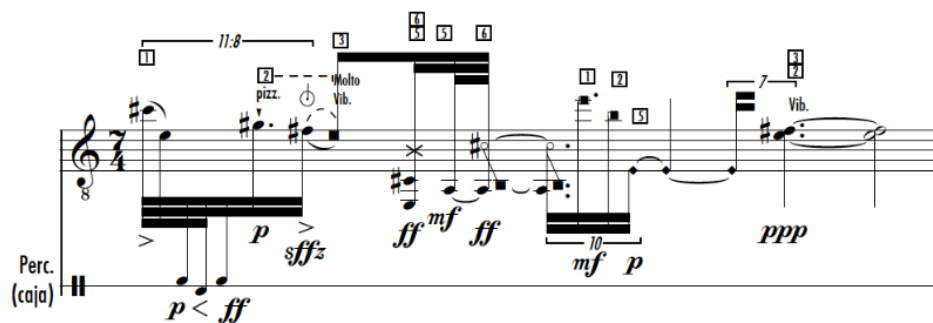


Figure 2.2. Germinal material in Relief VI.

²² Such a need, in fact, has meant the very first actions in most of the pieces I have written—see, for instance, *Relief II* (1999–2000), *Relief V* (2006/2013), *Matters of fact* (2015/16), and *Tacto* (2016/17). Listening to them at <https://www.moralesossio-composer.com/audio>

²³ Listen to this example here: <https://www.moralesossio-composer.com/figure-2>

The seven-minute first version²⁴ (2011) represented a starting point for engagement in a process of creative collaboration work which was directly related to technological means: the composition system was set up with OpenMusic²⁵. The collaboration is characterised by dialogical exchanges of ideas within general and specific frameworks ruled by both the nature of the initial material itself—coming from my improvisations—and harmonic/temporal principles that I deduced from it. However, beyond any technical analysis of musical materials and their developments, the collaborative experience in *Relief VI* allowed me to configure a model that has been adopted for the construction of a new version of the piece (work in progress²⁶ from 2016) from which I included the two first structures in my portfolio. The final project is a work of around 30 minutes duration.

The process focused on four relevant aspects:

1. The creation of generative dynamics developed between me, as a composer, and a specific performer (Diego Castro-Magas);
2. Scheduled rehearsals in which we worked together on shaping figures and form;
3. Ways of projecting my own instrumental physicality (physical relationship with the guitar) onto that of Diego and his professional background; and
4. Discussions about coherent notational ways to communicate gestural qualities.

The model can be seen as a multi-agential ecological framework where the knowledge is distributed between human agents (composer and performer's creativity) and devices acting as tools (computer and guitar). Interestingly, during my doctoral investigation I could find similar experiences concerning the method I was attempting to define in *Relief VI*. In fact, in the study of creativity and collaboration framed by the compositional process of a concert piece *Tongue of the Invisible* (2010–2011, 2013b), by Liza Lim. Clarke, Doffman & Lim (2013) stress the ecological character of the collaborative creation that involves “[...] the enacted physicality of individual musicians’ creative engagements with

²⁴ A recording of the piece can be listened to here: <https://soundcloud.com/cmoralesossio/relief6>. *Relief VI*'s first version score can be downloaded here: https://docs.wixstatic.com/ugd/1cce2f_5b3cf8c82c104ffcbd8b28e1d79484dd.pdf

²⁵ OpenMusic is a visual programming software based on Common Lisp programming language (see <http://repmus.ircam.fr/openmusic/home>).

²⁶ Even though it is not a finished piece I wanted to include this progression in my portfolio since the discussion about methodological matters involved in *Relief VI* seemed fundamental in order to explain the origin of the ideas I attempt to develop in this dissertation.

their instruments and notations [...]” (p. 630), among other elements. Furthermore, these authors provide an approach to the sense of a musical ecosystem by considering it “[...] as constituted of objects and processes whose affordances criss-cross the physical and the social, the synchronic and diachronic” (p. 630). In a general sense, these thoughts link to my own perspective on collaborative work, however, its particular multi-agential dimension connects more with developments in cognitive sciences such as Bateson’s *Steps to an Ecology of Mind* (1972); Clark & Chalmers’ *Extended Mind* (1998); and Hutchins’ distributed cognition concept (Hutchins, 2014). These three researchers emphasise the internal and external circulation of knowledge. From Hutchins’ point of view, even the sole brain could be analysed as a distributed cognition system, since the information and knowledge are spread out among neurons, which activate complex inner interactions (p. 37). However, he also highlights that cognition is also distributed and coordinated across human brains, devices, and tools. Clark & Chalmers define the distributive property of cognition as ecological assemblies, meaning that cognitive processes occur in conditions of an “active externalism” in which “[...] the human organism is linked with an external entity in a two-ways interaction, creating a coupled system that can be seen as a cognitive system in its own right” (p. 50).

However, a more significant influence on this research is Bateson’s concept of ecology of the mind. According to the ecological perspective of this English social scientist, in a system, organisms not only interact with each other but also in continuous transformation with the environment in which they operate. The performance of an individual who is in charge of specific operations within a system is determined “[...] by the behavior of the other parts of the system, and indirectly by its own behavior at a previous time” (p. 322). At the same time, as Bateson pointed out, there is an interactive character of the holistic and the mental aspects being implicit within a system that could define, from my viewpoint, recursive patterns in three ways:

- a. Individual “governor” (the one working in a steam engine) acts as a “sense organ or transducer”. This agent tenses a difference between the current information provided by the system and “some ideal or preferred” conditions (p. 322).

- b. “Message material (i.e., successive transforms of difference) must pass around the total circuit, and the time required for the message material to return to the place from which it started is a basic characteristic of the total system” (p. 322). It means that there is a material susceptible to be transformed and reintegrated into the system.
- c. From the cybernetics viewpoint, there would be a decisive memory since specific behaviours depend not only on the recent past “but by what it did at a time which precedes the present by the interval necessary for the message to complete the circuit” (p. 322).

In this background, the “mind” is immanent within a system idea understood as a complete circuit that includes the “mental” characteristics of all organisms, human, and materials²⁷, that participate together therein. Thus, an artefact like a computer—which is itself a system—participates in a network which is “[...] not bounded by the skin but includes all external pathways along which information can travel” (p. 325). Such a machine may be expected to self-regulate its organisation of files, for example, but do not create “mental processes” implying the transformation of inputs and outputs. This artefact may only be considered as a piece in a complete circuit and it is always connected to a man and a context. The whole ensemble creates continuous exchanges of information in trial-and-error creative actions and includes “[...] those effective differences which are immanent in the ‘objects’ of such information” (p. 325).

The development of the collaborative work in my piece *Relief VI* is a first attempt to set up an extended practice of composition by considering this ecological perspective. From its parametric vectors to its expressive and subjective contents, the musical information

²⁷ Also see his famous ‘blind man’ example given in his article *Form, Substance and Difference*: “Suppose I am a blind man, and I use a stick. I go tap, tap, tap. Where do I start? Is my mental system bounded at the handle of the stick? Is it bounded by my skin? Does it start halfway of the tip of the stick? But these are nonsense questions. The stick is a pathway along which transforms of difference are being transmitted. The way to delineate the system is to draw the limiting line in such a way that you do not cut any of these pathways in ways which leave things inexplicable. If what you are trying to explain is a given piece of behavior, such as the locomotion of the blind man, then for this purpose, you will need the street, the stick, the man, the street, the stick, and so on, round and round” (Bateson, 1972, p. 466).

distributes across the agents and tools engaged in the process. The following illustration (*fig. 2.3*) summarises the whole process.

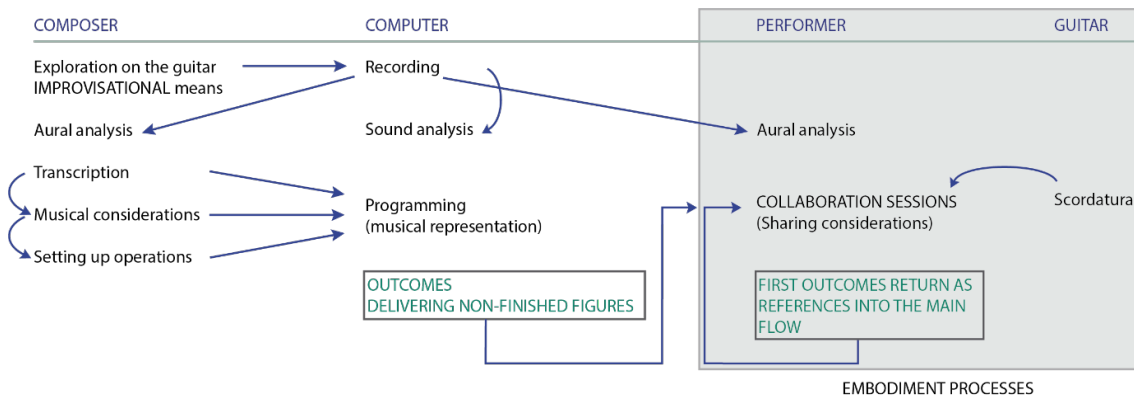


Figure 2.3. Distribution of the musical information in Relief VI.

The process started with the consolidation of an improvised material that I performed (see *fig. 2.2*) by means of recording and storing it on my computer, which allowed both aural analysis by me and Diego Castro-Magas (first approach to embodiment) and sound analysis by computational means²⁸. The actual compositional process commenced with the transcription of the germinal material (improvisation), which led me to distinguish the dimensions that articulated this material (musical considerations) to then going to set up different operations in order to systematise the construction of musical figures following parametric arrangements into the main program consisting of interconnected operations²⁹. The outcomes that the system managed consisted of ‘non-finished’ figures framed within different durations and rhythms. Pitches carried their own sounding mode (articulations) allowing the identification of different strata³⁰ that shaped the figures. Both the computer as a tool and the program that I had set up were always present during the collaboration sessions (see videos “RELIEF VI on bar 2” and “RELIEF VI on bar 3”) while deliberating figures to arrange into a dialogical dynamic between composer, performer, and the guitar as a body affected by the performer’s decisions. The outcomes were fitted into a temporal grid and their final aspects recursively acted as references to build further

²⁸ Analysis was made using AudioSculpt software (see: <http://anasynth.ircam.fr/home/english/software/audiosculpt>).

²⁹ This was set up with the musical representation software OpenMusic (see: <http://repmus.ircam.fr/openmusic/home>).

³⁰ These strata will be shown in detail later in this chapter.

figures until the whole grid was filled. As I show in the next pages, perhaps the whole process may be taken as a constant action of embodiment.

2.5 Layers and abstractions

As can be seen in the following figure (*fig. 2.4*, <https://www.moralesossio-composer.com/figure-4>), the very first impulse of the piece comprises a compact set of layers holding a correspondence between physical and sounding reliefs. Each layer has been named “canal”, so that the figure itself embraces 9 canals very different in nature. Even if the categories called “Pull-off”, “Pizzicato”, “Pitch”, and “Harmonics” are linked by pitch as a major analysable category, the differentiation that I made was by taking into account, on the one hand, the gestural nature (beyond a pitched sounds “Pull-off” remains a gesture, for instance), and, on the other hand, the timbral and articulative character (“Pizzicato” and “Harmonics”) which is, from my point of view, what prevails in terms of relief, in comparison with the pureness of the category “Pitch”. In the rest of the categories the pitch content is much vaguer, and the noise components are foregrounded perceptually.

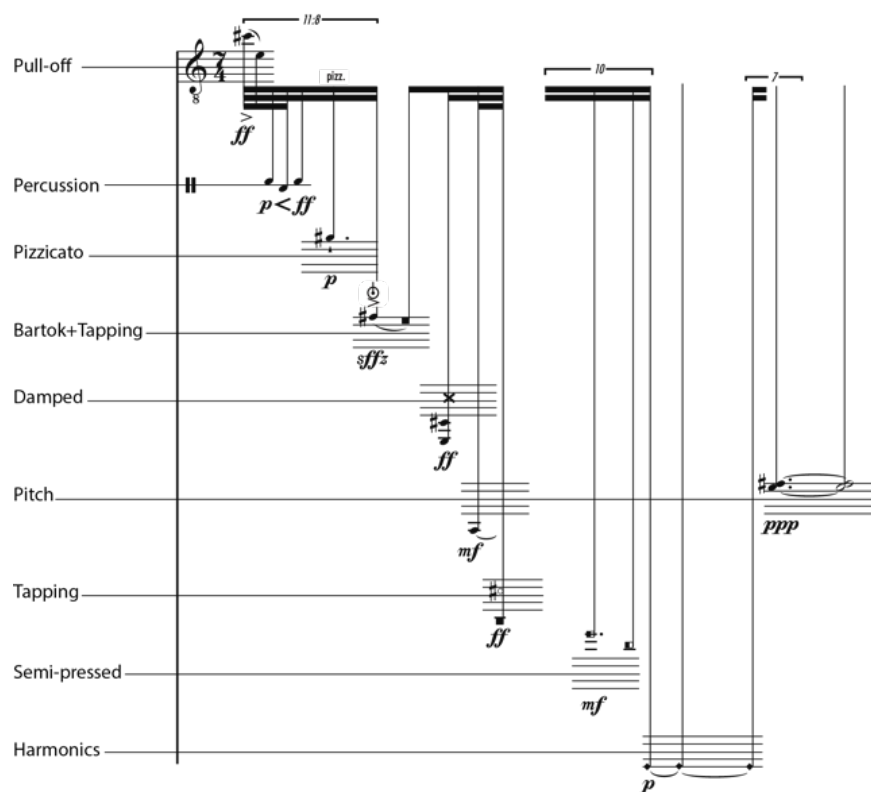


Figure 2.4. Germinal material strata in Relief VI.

2.6 Fragmentation and temporality

Preliminary visual/tactile motivations commented upon earlier led me to investigate the nature of functional contexts of music in relation to creating the idea of music ‘in relief’. Since about 2015, Swiss architect Bernard Tschumi’s notions of fragmentation, disjunction and event, are actively present in most of my works. Tschumi (1996a) thinks of the notion of fragments as being linked to the idea of architecture as language: “[...] architecture when equated with language can only be read as a series of *fragments* which make up an architectural reality” (p. 95). The Freudian concept of fragments, according to Tschumi (1996a), suggests a “[...] dialectical multiplicity of a process” (p. 95) instead of fracturing a pre-defined whole. Another concept being strongly connected to fragmentation in the mind of Tschumi is that of disjunction. In Tschumi’s (1996d) concept of disjunction there is a rejection of “[...] synthesis or self-sufficient totality [...]” (p. 212) in favour of a deconstructive and dynamic attitude consisting of “[...] constant, mechanical operations that systematically produce dissociation in space and time [...]” (p. 213). This anti-static view connects not only with fragmentation in the sense of a dissociative strategy but also relates to the idea of events as programmed sequence leaving its own traces since “each part leads to another, and every construction is off-balance, constituted by the traces of another construction” (p. 212).

As a temporal term, ‘event’ strains the notion of space, as a delimitation where something may happen. Tschumi (1996b) claims the most popular understanding of architecture tends to bring it “[...] into a passive object of contemplation instead of a *place* that confronts spaces and actions” (p. 141). Now I proceed to examine how the concepts of fragment, disjunction, and event were assumed in the specific case of *Relief VI*, and how these terms provoked inspiring reflections in this piece.

In *Relief VI*, the disjunctive is linked to the attitude of organising the musical material without regard to any hierarchy and order, and without any pre-established grammatical consideration. Indeed, the decision to place the ‘germinal material’ at the beginning of the new version (2015–2016), for instance, was made in an almost symbolic manner, since this material was the foundational event supplying the identities of the piece. In the

first version (2011), however, this material appeared at 3'10". The concept of event is associated to both the fact that every single figure in *Relief VI* involves a particular moment where the original material is reinvented and the fact that such figures have arisen as a result of interactive appointments where human and material agents work together.

The specific operation intended to organise the fragmentation of the germinal material takes particles of developments of every layer (C1 to C9) of such material. This dissociative action is actually about a structured support as a strategy to reassemble the particles into new forms. Every iteration of this operation has at least two important parameters to work within: a. Distribution of fragments. It is about a symbolic arrangement indicating the sequence of fragments required for the formation of a new figure; b. A time signature, which is the temporal space to which figures will be transferred and fitted. In architectural terms, these temporal spaces equate their meaning with "[...] meeting points, anchoring points where fragments of dislocated reality can be apprehended [...]" (Tschumi, 1996c, p. 178) and every point is understood "itself as a system of relations between objects, events, and people" (Tschumi, 1996c, p. 178). In *Relief VI*, temporal spaces are true "meeting points" where reunited fragments of a foundational object, performer and composer, and tools shape together seemingly nonsense materials by bearing in mind the nature of fragments, harmonic context, and their new linguistic potentialities. The following illustrations (*figs. 2.5 and 2.6*) show equivalences between Bernard Tschumi's main formal strategy in the conception of La Villette in Paris ("Built construit" ➤ "Explosion fragmentation deconstruction" ➤ "Implosion Recomposition Point frames") and my notion of fragmentation ("Germinal material" ➤ "Fragmentation Independent-developments" ➤ "Reassembling").

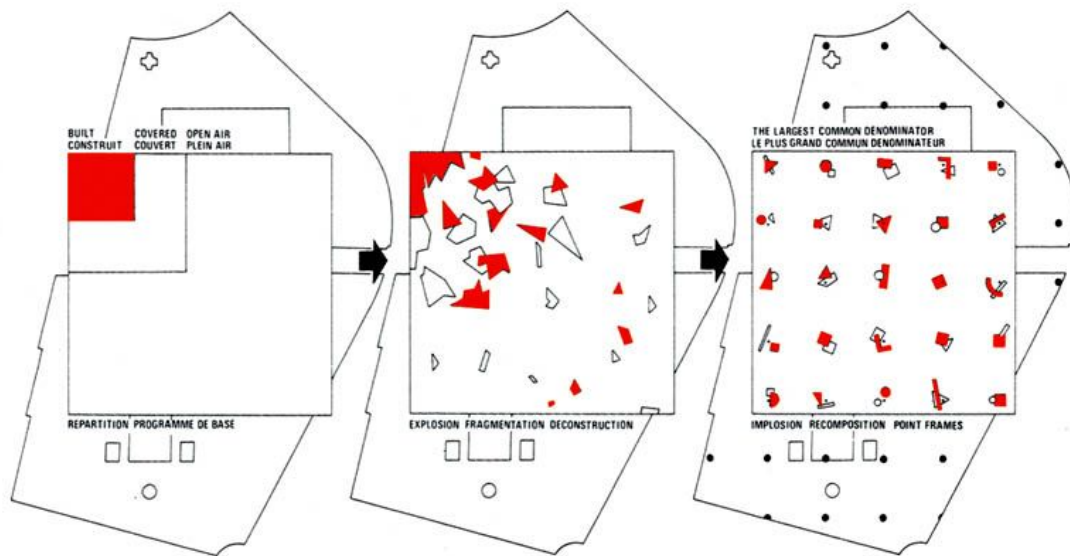


Figure 2.5. Bernard Tschumi's fragmentation.
("Programmatic deconstruction") in the conception of
La Villette in Paris (Tschumi, 1996c, p. 172).

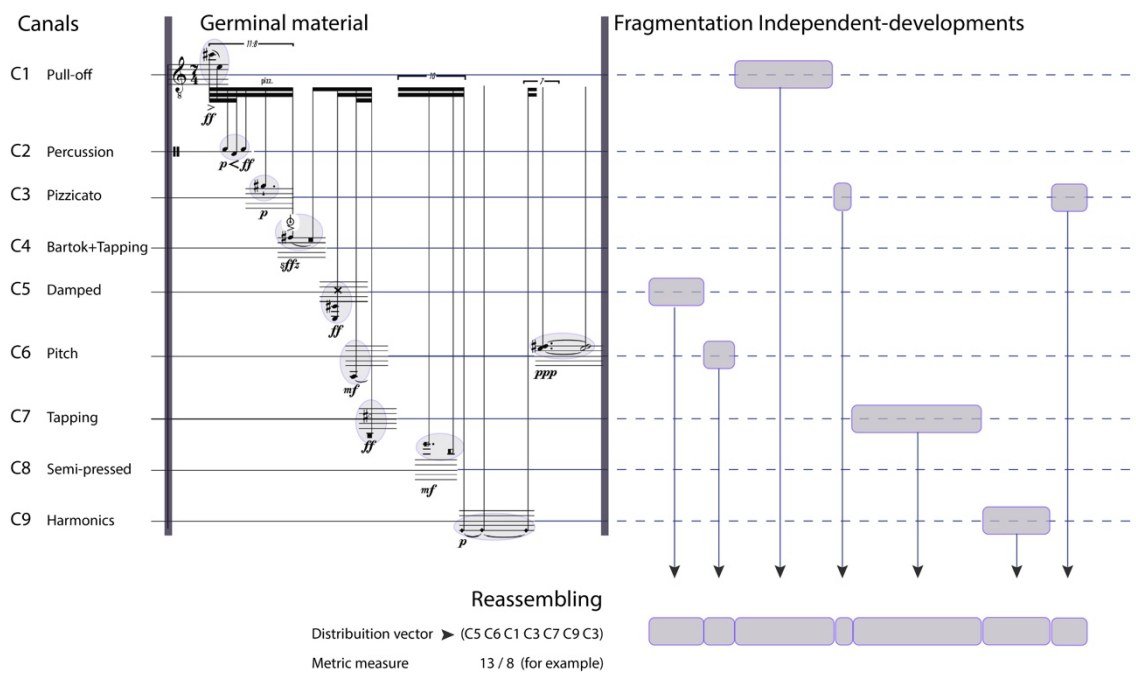


Figure 2.6. Fragmenting and reassembling operation in Relief VI.

However, the very first step in the organisation of the fragmentation process is to set up the temporal grid with different time proportions which are considered as “meeting point”, following Tschumi’s words. Concretely, the temporal grid is actually the entire sequence of empty bars with their respective time signatures which are the main constraints for the construction of figures. *Figure 2.7* shows the first page’s grid of the 2016 version (in progress):

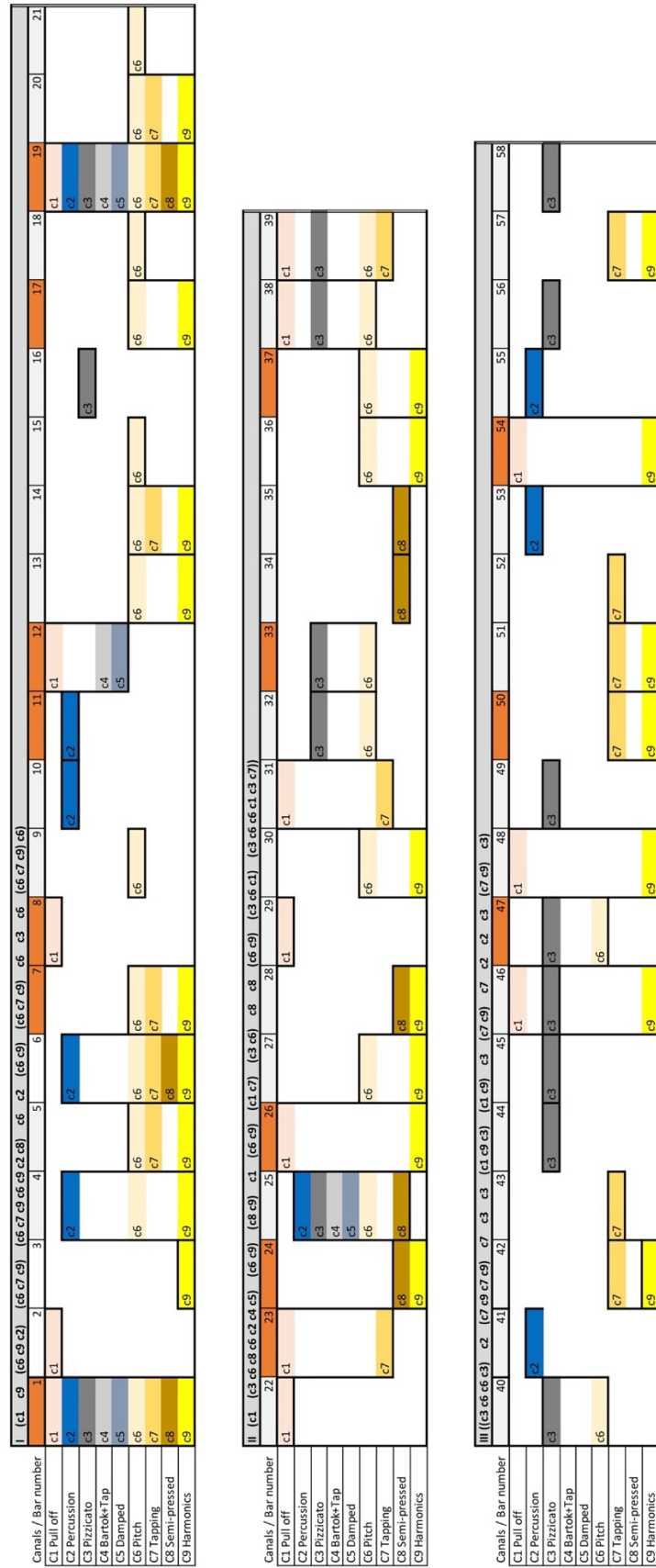


Figure 2.7. Relief VI, the temporal grid of the first nine bars.

The creation of figures is then the next step: each layer (C1–C9) describes its own development according to particular operations, generating pitch sequences and chords. The reassembling process takes a ‘distribution vector’—indicating the layer from which a fragment will be taken—and a ‘metric bar’. Rhythms for each figure are constructed with an independent algorithm that also takes as a parameter a ‘metric bar’ as well as durational properties extracted from the ‘germinal material’.

Along with the creation of the temporal grid I also designed a complete distribution of figures over the time of the piece. In order to generate the sequence of ‘distribution vectors’ for each of the 16 sections of the 2016 version, I set up a statistical method in OpenMusic. Once this calculation was done, I gathered these data in an Excel table in order to visualise the sequence. The figure below (*fig. 2.8*) shows an extract of the canals/bar-numbers table of the first three sections.

Figure 2.8. Canals/bar-numbers table for Relief VI.

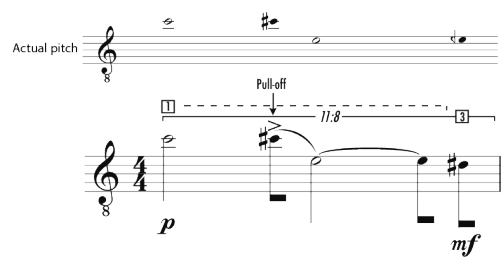


In this version, I relocated the older figures that formed the 2011 version³¹. The new distribution for some of those figures can be seen in dark orange in the table (bars 1, 7, 8, 11, 12, 17, 19, 23, 24, 26, 33, 37, 47, 50, and 54). The grey row, at the top of the table, holds the ‘distribution guides’ for each section. There is a clear presence of canals 1, 6, 7, and 9 over the first three sections of the piece, and also a progressive presence of C3 (*pizz.*), whilst C2 (Percussion) mostly congregates in the first period. The opening, headed by the ‘germinal material’, marks a tendency of colour explosions for the two first periods. In fact, the total density of canals appears also in bar 19, and, despite being only partial in terms of density, bar 25 represents an important ‘aftershock’ of those bursts.

This table characterised an important contribution to the collaboration work, as it has allowed a major concentration to work more precisely in internal aspects of figures and their concatenations. The following videos show collaborative work made to shape figures in bars 2 and 3 (canals C1-Pull off, and C9-Harmonics, respectively):

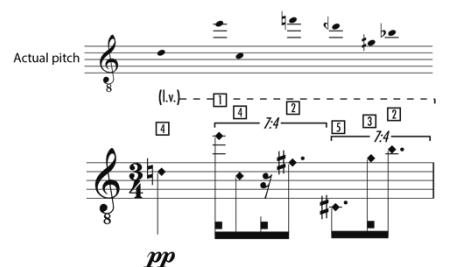
Relief VI. Bar 2

(https://youtu.be/bGk_Kjn3joE)



Relief VI. Bar 3

(https://youtu.be/W6HINJoA_Gg)



Both videos show that the shaping process to define figures started by trying different options on the guitar according to its fingering possibilities. In a further exploration, the collaborative work considered phraseological, sound aspect, and concatenation criteria.

“DCM - And then this D sharp is joining ...
 CMO - yeah, the resonance of the last notes of the last figure”
 (Retrieved from video **Relief VI. Bar 2**)³²

³¹ For example, the ‘germinal material’ that appeared at 3’10” in the first version has been relocated in the first bar of the new version. See the score here: https://docs.wixstatic.com/ugd/1cce2f_5b3cf8c82c104ffcbd8b28e1d79484dd.pdf

³² Abbreviations CMO and DCM are for Cristian Morales Ossio and Diego Castro-Magas, respectively.

In addition to constituting a first approach to embodiment by Diego, this process also describes a first approach to the idea of recursion. For example, one of the most important considerations for the construction of bar number 3 was the content of bar number 2, understood as an inertia that required a new container. As will be discussed later in this chapter, one of the most determining characteristics of the circular process is the fact that the current state of the elements that circulate therein depends on and are defined by the previous states. Given that there is no previous planning concerning the macro-formal aspect, it is the concatenation decisions that generate the identity of the piece, including the long-term gesture. These actions articulate a certain grammar and syntax that generate an idea of language as a set of fragments disjunctively connected to each other to create new phraseological spaces and new readings, similar to Tschumi's (1996a) conception regarding architectural space as language (p. 95).

2.7 Primary approaches to recursion in *Relief VI*

Good and bad are only the products of an active and temporary selection, which must be renewed. (Deleuze & Guattari, 1987, p. 10)

Certainly, the active-generative process deployed over the compositional time of *Relief VI* involves various features that might be taken as intuitive recursive methods. The specific contribution that the composition of this piece has given relates to the assumption of a multi-agential platform to articulate an extended workspace. I have identified eight essential qualities that have emerged from the core of this process:

1. The new fragmentary elements can be viewed as an asymmetrical sequence describing traces of organic/changeable connections in a medium that embraces the agencies of performer, composer, and computer. This medium acts as a machine that repeats specific operations of selection and combination.

2. Organic qualities and *smoothness* into the medium depend on repetitive human communicative interactions in relation to diverse (inert) outcomes released by computer.
3. Each part of the medium connects with others. Deleuze (2006) refers to Nietzsche's eternal return to explain how repeated ways of thinking can create a meaning of 'synthesis' characterised by containing connected lines of forces of returning relationships (pp. 50–52). The *Relief VI* compositional process involves, as an assemblage, repetitive relationships between its agents which, in turn, connect with the piece itself, seen as a wider territory allowing the growth of further interconnections.
4. At the same time, interconnections of agents with the piece describe a process of learning and *formal* discovery feeding such interconnections back and reinjecting emerging information into the system at every instance.
5. The variability of the whole process is managed by the randomness of both the prescribed operations into the musical system and the unexpected results of human interactions and their relationships with programming tools—as a machine of musical representation. Thus, energies flowing within these interconnections are continuously regulated by a kind of entropy defining the multiplicity of characters in the piece.
6. Materialisations and variations in any interconnecting system may occur through operative repetitions where principles of multiplicity and difference emerge.
7. Repetitive decision-making actions in local temporal periods describe a knitting attitude in conceptualising form whilst simultaneously creating unpredicted grammatological patterns that give identity to the piece.

8. The mutual constructivist approach developed in *Relief VI* in the score as a text where performer, composer, computer, and interactional contributions appear as engraved traces of a multi-embodiment process.

2.8 Towards a systemic approach

My idea of an extended compositional practice is an attempt to delve deeper into traditional social ways of writing processes: I try to rethink the meaning of roles in the musical practice. Historically, music creativity has always been a merging open space where—though individual actions and roles—performers, composers, and tools interact in scheduled meetings. It seems evident that composers have developed the writing tradition from their own compositional methods, but it is not so evident to state that, beyond its interpretative quality, performance practice also involves a writing process. Personally, I think that, in fact, music performers keep a writing practice, although perhaps not in the sense of writing music on manuscript paper³³ nor in the sense of imagining a building process, but certainly in the sense of the embodiment of the music in both mind and instrument as a kind of engraving of knowledge that also stimulates imagination through direct interactions with musical materials. At this point, my main contribution relates to a method of composition that adopts the presence of the performer as a creative agency in the process of writing itself, as well as the presence of tools in working together. I claim, thus, a shared creative practice and a mutual attitude of creative permeability are needed to carry out such a method.

Relief VI has been a deeper development of this musical approach. The particular contribution of this piece to my compositional research was made with the aim of creating a method that allowed me to organically couple a performer's mind and tools with my personal practice, acting together as an extended creative system. Since this approach involves a concept of multi-agencies convergence and, as such, it can be analysed as a system—and even ecosystem (in the sense of Bateson's *Steps to an Ecology*

³³ Except in cases where performers compose music as well (in the case of Swiss oboist and composer Heinz Holliger, for instance)

of *Mind*, and also Tim Ingold's perspective³⁴)—complex qualities can be taken into account: the variety of elements, organisation (in opposition to separability), openness, interaction, exchange of energies, emergence, memory, randomness, adaptability, and, especially, recursiveness (see Edgar Morin's *Method V.1: The Nature of Nature*). The notion of system that appears in my extended workspace is in itself recursive, since the effect of the interaction among agencies, as well as the diversity of their emerging possibilities, retroact into the parts of the system. In this respect, this integrative conception implies an understanding of the system as unitary wholeness, since the effects that interrelations produce are, simultaneously, material, process, and music to be performed. This idea of system is more than a mechanical working of parts participating therein. However, this does not mean that I aim to achieve a kind of horizontality of roles, where the agencies assume different actions to those that they have been originally called to do. Concerning this particular view about the concept of system, French philosopher Edgar Morin (1992) attempted a basic definition, saying that system is "[...] an interrelation of diverse elements constituting an entity or global unity, [...]" (p. 147). Morin emphasises the fact that most definitions have considered the relationships between constituents, and the sense of totality in the concept. Nonetheless, it is in that of Swiss linguist Ferdinand de Saussure (1857–1913) where Morin found that a link between interaction and totality implies the crucial principle of organisation (p. 99). The system is, Morin quotes: "an organized totality, made up of interdependent elements holding together and not able to be defined except one by the other in function of their place in this totality" (Saussure, 1931). Thus, an updated definition of system, according to Morin, would be "[...] a global unity organized by interrelations between elements, actions, or individuals" (p. 99).

In this sense, it is precisely this definition that can better explain my idea of an extended practice. What I have attempted to articulate in my investigation is not a system where, rather than an individualistic habit, the musical writing is intended to be held up by more than one mind, tools, actions, and materials in organised recursive dynamics. The musical writing, in turn, is no longer understood as a 'notated' product but as a process that

³⁴ See Tim Ingold's (2012) "Toward an Ecology of Materials"

reveals and materialises within and between composer, performer, and tools in diverse forms and, in my collaborative work, is placed at the intersections of individual practices. Therefore, from this systemic assumption of making, the entire process, and especially collaborative work, holds generative features whose results are further developed in two ways that I will discuss in the next two chapters.

3 Recursion and generative–collaboration embedded in an extended compositional system

3.1 Overview

In the first group of pieces that I present in my portfolio (*Relief VI*, *Matters of fact*, *Tragic duet*, *Tacto*, *Elogio de las cosas vacías*, and *Viaje al cielo de Occidente*) the concept of recursion has been embedded in the core of a human/computational system: formalised compositional operations are combined with collaborative routines. The method that I have developed in this group of works may be defined as a coupling system (fig. 3.1) where composer, creative performer and compositional tools and computational means recursively interact to produce pieces of music.

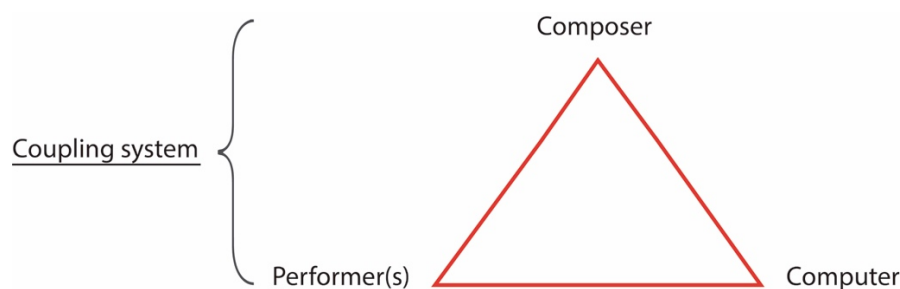


Figure 3.1. Triangle composer/performer/computer.

I have devised a systemic approach combining the formalisation of compositional processes with social practices in music. Rather than only considering it an ordinary programming strategy which generates musical material, the extended practice that I pursue aims at integrating recursive dynamics appearing in cognitive-creative processes within social-ecological contexts. From this cognitive perspective, the model that I try to implement can be seen as a 'distributed cognition' system. According to recent studies on cognition, a cognitive process can be considered as such if it is not limited to individuals, the relationships between elements are functional and the management of symbols occurs beyond the domain of individuals (Hollan, Hutchins, & Kirsh, 2000, p. 175). In contrast to classical views on cognition, the modern perspective considers

cognition to be distributed across the elements of a system which act together for common purposes. Thus, cognitive processes may be spread among units, they can coordinate materials and environment, and, most importantly, they can transform the actual events by considering the features of the previous ones. This distributed cognition approach states that “[...] social organization is itself a form of cognitive architecture” (p. 177) and, through this social view, “[...] the cognition of an individual is also distributed” (p. 177). Another relevant principle of the distributive approach is that the cognition is embodied, meaning that the human body, brain, tools, materials, as well as their relationships, take on crucial roles in the way that agents perceive and react to the environment. From this point of view, a musical instrument, for example, as a tool participating in a distributed process, is a central way to assimilate (embody) the musical universe with which the performer deals.

In the next pages, I will discuss how recursion has been assumed within this comprehensive method in *Matters of fact* and *Tragic duet*—as two cases of exhaustive application—and also in *Tacto*, *Elogio de las cosas vacías*, and *Viaje al cielo de Occidente*, where the model was only partially applied. However, before going straight into the analysis of these pieces I aim to show how conceptual considerations, which have been valid for each of these pieces in different degrees, articulate the different composition processes.

3.2 System and process: exhaustive application in two cases

Systematisation and circulating mechanisms can easily evoke certain algorithmic approaches in the two main pieces that I proceed to comment on this chapter. However, the constant dialogue with materials and its processes in the domain of programming combined with the social angle of my concept are the features that distance my model from any algorithmic-music aesthetics. Rather than seeing the computer as a machine providing solutions, I consider it to be a mechanism that delivers ‘raw’ materials (pitch/time structures) to be prepared in an extended ‘kitchen’ where composer, performers and tools ‘cook’ together to attain demarcated and finished figures. The *recursiveness* of the process is not seeking predictable results but asymmetric

occurrences, unlike the self-referential procedures that can give rise to fractals or semi-repetitive patterns (see Chapter 1). In this sense, human beings are considered agents for an extended understanding of algorithmic procedures; they are themselves part of a whole system. In fact, the final form of the piece depends on a combination of the material emerging from performers' creative tasks with fragments of music acting as reference for collaborative instances.

In my workspace, I have considered the concept of system from a holistic perspective, with no "unilateral control over the whole" (Bateson, 1972, p.322). Interrelations between its components, and its relationships with the environment are defined by inputs and outputs interchanging different kinds of information (Backlund, 2000, p. 4). However, my own idea of system is best described through the notion of complexity, specifically the one developed by French philosopher Edgar Morin (1992a). Following the main characteristics of complex systems that he distinguishes (pp. 380–383), I would like to highlight five features that illustrate the ideas surrounding Group 1 of my portfolio:

1. Openness. Since collaborative work sets specific tasks for both performer and computer the score resulting from these dynamics might be considered as one of several versions only. Further versions could be achieved through the participation of other, completely different, performers which will certainly vary the outcomes.
2. Closedness. The compositional process is certainly limited by time as well as the initial collaborative rules that have been established. Additionally, there is a second closure that is given by the performer's qualities: musical persona, skills, particular preferences and tastes, etc. Hence the compositional framework that I set up for generative-collaboration is doubly closed by its own constraints and by the performer as an individual system.
3. Creative circular dynamic. In fact, recursion is not only present as a natural cognitive phenomenon occurring within a social system. I have also conceived it through diverse operations embedded in both the abstract terrain of compositional procedures and in the way that I distribute and share my materials with performers.

4. Self-organisation. My final goal has been to provide suitable conditions to distribute creativity in the sense that Linson & Clarke (2017) point out: through *embodiment* —as viewed in cognitive sciences—that considers mind and body as cognitive distribution lanes; interactions between “organisms and environment” (p. 55) through the use of tools “(such as musical instruments)” (p. 55); interconnection between individual knowledge and that of others creates “[...] conceptual categories, sensibilities, and languages [...]” (p. 55) mutually built.
5. Self-identity and the voice of the ‘I’. In *Matters of fact* and *Tragic duet* mainly, the development of a musical writing process including creative actions by performers forms the identity of the piece. In fact, interchanges of particular energies lead to the notion of version since the identity (energy) of the performer is engaged in the (eco-self) organisation. In the particular compositional process of Group 1 pieces both the performer ‘I’ and composer ‘I’ are complexly entangled into a generative structure that allows to not only systematically work but also to include accidental³⁵ discoveries and spontaneous inventions.

The following diagram (*fig.3.2*) gives a general summary of how this system approach has come to fruition in the compositional processes of *Matters of fact* and *Tragic duet*.

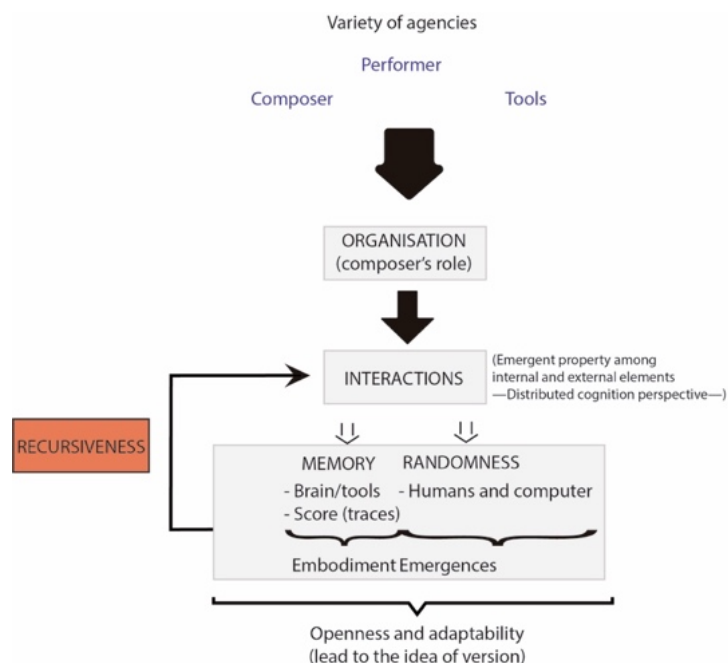


Figure 3.2. System approach in Matters of fact and Tragic duet.

³⁵ Further on this chapter I will comment on some considerations on the notion of accident appearing in the composition of *Matters of fact*.

In this model, there are several agents taking part in the writing process. The composer's role is to organise and provide conditions and materials for generative interactions with the performer in the collaboration. These conditions prompt elements of both recall and randomness from performer and computer. Embodiments and emergences resulting from this central stage recursively occur according to several rules established by compositional considerations and the potentialities delivered by the performer's actions. The form of the piece and its particular identities depend in part on the relationship between the compositional context and a specific performer's creativity, so that the working structure is open to further versions. I will now comment on the different types of interrelation I set up in the first group of pieces. Subsequently I will clarify how recursion is embedded in the conception of *Matters of fact* and *Tragic duet*.

A central idea that can better outline the systemic facet of my working structure in the pieces commented in this chapter is interaction. In my personal approach, this does not relate to the relationship of performer/computer producing real time sound results (see IRCAM *score follower* system, for instance). Instead, the concept of interaction is present in various aspects framed within my idea of extended compositional practice. For instance, regarding the relationship of composer/computer my work has essentially focused on programming organisational algorithms, configuring logical procedures, and doing analyses, among other tasks. As soon as these actions are stated, the computer issues the first outcomes. My next step is to do successive readings from the emergent materials. Hence my relationship with the computer involves a first conceptual stage, and a second dialogical stage in which the machine plays an assistant role in instantaneously delivering structures. This creates a primary facet of recursion since both programming engagements and imagination mutually affect each other.

Concerning the relationship with performers, I explore the possibility of engaging performers' creativity in the domain of writing music processes. But this interactive property involving exclusively humans is also mediated by the role of the computer since, as an extension of my mind, it feeds recursive dialogues intended to generate materials that shape the whole piece.

There is an especial focus of attention on how musical materials interact with each other: outcomes originating from my initial processes, and emergences resulting from performer's creative tasks, are treated in a way that transformative operations embrace interactions between both material sources. Once they have been consolidated as such by notational means, I operate specific functions that take different sources featured by various shapes and expressions. Many of my interactive procedures are (discrete) adaptations from some signal processing concepts. Next in this chapter I will comment how these operations work in *Matters of fact* and *Tragic duet*.

Interaction as a fundamental quality in an understanding of the overall structure, as well as a particular development in my compositional system, is actively articulated by determinism and indeterminism. In fact, they constantly operate together describing a fixed/unfixed dichotomy³⁶. This concept seems evident in the programming domain, where I have implemented, for instance, either random procedures with constants inputs—such as harmonic fields or duration 'pools'—or fixed operations manipulating random inputs. However, this is less obvious from the viewpoint of the performer's contribution since the mentioned dichotomy operates mostly in the inner (mind) domain. Thus, a fixed/unfixed dichotomy present in both the machine and human frameworks makes up the most relevant facet of recursion in my practice: the musical matter circulates through a system that encompasses symbolic logic and human decisions both being articulated by random factors and acting as continuous transformative filters.

The diagram below (*fig. 3.3*) synthesises a step-by-step recursive process. The triangle to the left represents inputs from composer (on top)/ performer (on the bottom)/ computer (in the middle). The three sides of this triangle exemplify how roles can move or combine with different agents. The process itself has been placed on the right side.

³⁶ I have also explored the concept of dichotomy from a performative point of view in my piece entitled *Eleven fragments* (2016), which will be commented in Chapter 4

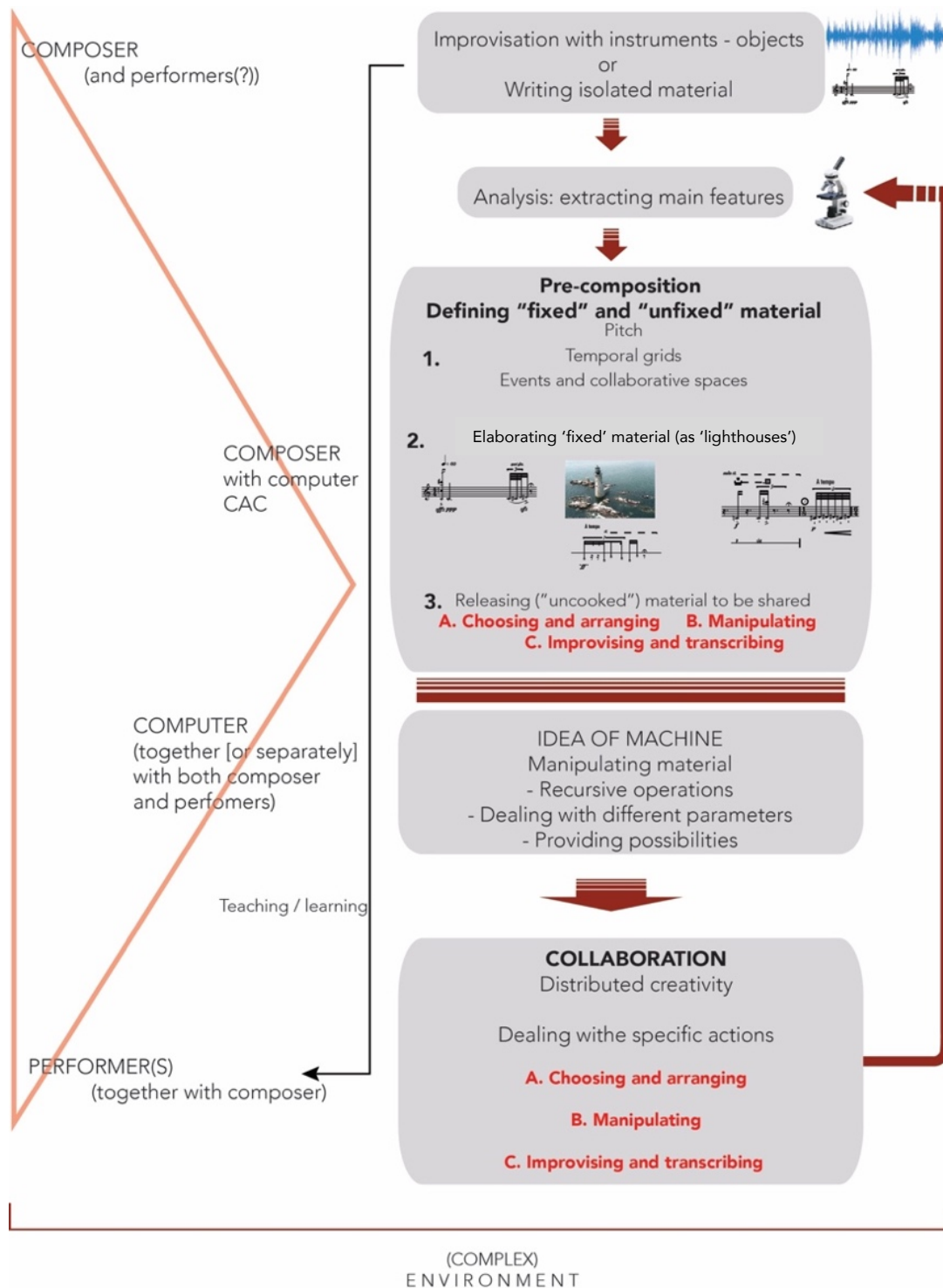


Figure 3.3. Recursive model for Matters of fact and Tragic duet.

An initial state of musical materials is obtained from either free improvisation—that might be recorded and then transcribed into musical notation—or notated musical material to be shared with performer(s). This step can be made by performers too, but

this was not the case for the Group 1. From an operative viewpoint, improvisation can be considered here as a generative strategy, but beyond this aspect, this provides significant abstract and concrete qualities to configure the identities of the piece. Next in the diagram I analyse and extract the main qualities of the (initial) musical material to then decide on its ways of transformation and formal possibilities. I often make transcriptions from recorded material by using sound editing and/or spectral analysis software³⁷.

Once I enter the pre-compositional stage the aim is to organise a platform in which I gather the aforementioned agencies' forces. In this stage I have worked on three dimensions: elaboration of pitch sequences, rhythmic developments, temporal grids, and the scheduling of collaborative work; elaboration of material to be fixed into the score. I have named the reference framework 'lighthouses'; these can be understood as detailed notated music contextualising material for 'adrift' collaborations. The contents of these spaces are given by the nature of the initial inputs that I have often obtained by improvisations and instrumental explorations, the elaboration of the material to share with performers, and the establishment of rules of collaborative actions between performers. The pre-compositional stage can be understood as a machine that treats material with particular recursive procedures and parameters. This provides diverse outcomes to be distributed in the ways that I described in point three of the previous list (see 'main characteristics of complex systems', p. 81).

The interaction between materials coming from collaborative activities and the 'lighthouses' generate diverse figures to be placed within the temporal grid to create the whole form. In this respect, my method of using reference material ('lighthouses') might, to a certain extent, be comparable to that of British composer Richard Barrett who uses musical notation "[...] to suggest possible directions or possible points of focus [...]" (Barrett, 2014, p. 62) for free improvisations by performers. Similar practices can be found in Liza Lim's *Tongue of the Invisible* (2010/11) and her collaborative approach. In this work for two improvising soloists (pianist and baritone) and 16 musicians that also explores the relationships between improvisation and notation, Liza Lim has written detailed different

³⁷ Pro Tools, Adobe Audition, and Audio Sculpt, for example.

solo lines (oboe, violin, piccolo, trumpet, cymbalom, percussion, together with the two soloists) to “[...] create reference points for later more improvised approaches to shaping and ornamenting musical ideas, so that the composed parts are translated or reinterpreted by the performers, taking the music in unforeseen directions” (Clarke, Doffman, & Lim, 2013, p. 634). Although Richard Barrett considers improvisation as a “[...] method of composition [...]” (Barrett, 2014, p. 61), his practice does not involve a writing process to achieve a notated trace of the collaborative moment. Liza Lim sets up and distributes specific material for performers to refer to, and, like Barrett, there is no regard of possible notational consequences of the collaborative work during rehearsals. However, these two examples have been particularly useful to my research to understand the range of creative engagement that performers can assume.

An important attempt to integrate collaborative dynamics into compositional processes is that of Fabrice Fitch (composer) and Neil Heyde (cellist). Their mutual work is framed by Fitch’s composition *Per Serafino Calbarsi II: Le Songe de Panurge* (2002–3), involving a dialogical practice featured by “[...] a constant exchange of ideas in which concept, technique, and realization were held in fine balance [...]” (Fitch and Heyde, 2007, p. 71). The focus was on the development of “[...] the idea of composition as a species of instrument-building [...]” (Clarke, Doffman, & Lim, 2013, p. 632), a particular interpretation of Helmut Lachenmann’s compositional research (*musique concrète instrumentale*). Through the instrumental exploration, and particularly through the *scordatura* that Fitch and Heyde set for the piece, the authors navigated a process of ‘invention’, understood as ‘discovering’ (p. 83). They point out that their work is “more open-ended” (p. 93) than conventional collaborative processes. In the latter a composer presents an almost completed score to performers who, the share their instrumental skills and knowledge with him. This denotes at least the intention that collaborative work had a relevant role and decisive repercussions throughout the compositional process in the case of Fitch and Heyde. The authors distinguish two “levels of methodology” (p. 93) from the research perspective: on one hand the aforementioned instrumental exploration (‘invention’), and on the other hand a “[...] re-evaluation of the composer-performer relationship [...]” (p. 93). Their collaborative focus shows a clear orientation towards “‘Re-inventing the cello’” (p. 92) as the embodiment of musical ideas, ‘discovery’

of sonorities (p. 75), interactions between text and vocality/instrumentality as well as conversations intended to solve instrumental problems. However, these authors do not provide clear information about the ways that collaboration was organised as a compositional system. Instead, Fitch and Heyde's collaboration held, as the authors acknowledge, an "[...] improvisatory aspect: nothing was too fixed in advance of our sessions [...]" (p. 93) as a part of an open space to discover the identities of the piece.

Guided by the idea of writing music via collaborative paths—rather than 'in-real-time' interactions (improvisations) of performers and materials—my compositional endeavours first pursue to organise a workspace from the perspective of the pre-compositional stage (see point 3 above) to then setting up detailed actions and materials feeding collaborative appointments. In turn, these actions are repeated in the process as many times as collaborative points are scheduled into the temporal grid (recursion). I seek to make the creative identity of performers emerge by considering the tension between their own sensibilities and musical notation as a means of preservation of ideas. In such an orientation, decisions concerning extended techniques, fingerings, timbre, etc., arise only from the collaborative stage projected as a recursive compositional process in itself, and not from the "[...] pre-compositional joint invention, where composer and performer work together [...]"—as Gorton & Östersjö (2016, p. 581) distinguish.

In the collaborative stage I deal with the specific actions scheduled into the time-grid that I set in the pre-compositional phase. In both *Matters of fact* and *Tragic duet* these time-grids provide measured bars to develop three specific kinds of actions to be executed by performers (named *Collab A*, *B*, and *C*) with the guide of the composer. The content of these collaborative points is the result of recursive interactions between composer, performer and computer, having as a reference point the so-called 'lighthouses' which provide relevant musical features.

- A. *Collab A*. CHOOSING/ARRANGING: Among several figures with specific characteristics that I provide, performers must choose one of them to

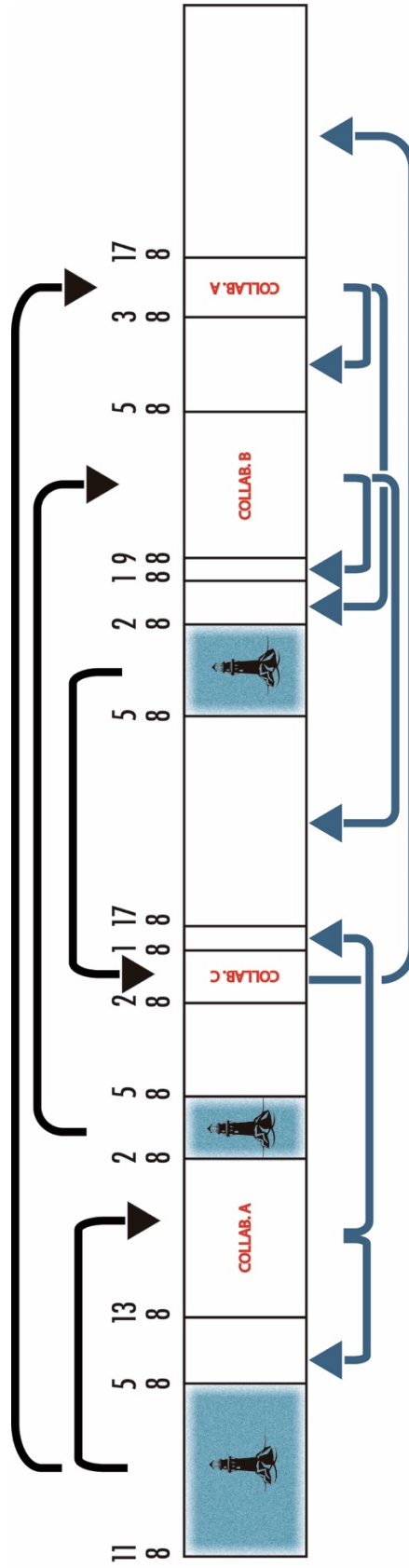
then arrange it in terms of tuning, timbre, dynamics, pitch correction (octaves). This material could even be alienated.

B. *Collab B. MANIPULATING/MUSICAL OPERATIONS.* Given pitch materials, performers must manipulate both rhythmic possibilities and expressions according to the tension produced during their own playing and the constraints of duration within the time grid.

C. *Collab C. IMPROVISING/TRANSCRIBING RESULTS.* Considering lighthouses and previous operations, performers must improvise within specific durations (time signatures). Results are recorded and then transcribed into musical notation with the aim of consolidating the main characteristics.

Through these three actions I aim to stimulate the creativity of performers within delineated frames ('lighthouses'), or, in sound-design terms, by sending 'impulses' to which performers must respond with their specific qualities of resonance. This is the kind of action to be applied recursively during the compositional process. Such a crucial moment within the whole working structure carries the idea of form intended as a matter to be shaped in 'knitted' ways rather than following a predetermined scheme. *Figure 3.4* illustrates the kind of structure that I have described: the time-grid embraces and organises diverse interactions between referential materials ('lighthouses') and the outcomes of the different collaborative tasks to define adjacent bars.

Figure 3.4. Recursive actions and collaboration scheduled in the time grid.



3.3 *Matters of fact* (2015/16), for Helder tenor recorder and guitar

The original project for this piece started in 2015. The piece was recorded by Paola Munoz Manuguán (Helder tenor recorder), and Diego Castro Magas (guitar) and appears on the CD called *Matters of fact* (2017). The title was inspired by concepts appearing in *Francis Bacon, The logic of Sensation*, by Gilles Deleuze. The deep analysis of Francis Bacon's paintings that Deleuze develops in this book has provided me with some kind of *reservoir* of ideas that can potentially be extrapolated into both an aesthetic search and into technical invention. However, although my first impulse was to systematically implement each single procedure described by Deleuze, I soon understood that this task would be enormous and might require a further study. Nonetheless, various fundamental questions arose from the reading of these thoughts which have inspired a significant part of my work. For instance, the concept of *figure* (Deleuze, 2003, pp. 1-7) and its relationship with the *figural* in opposition to the notion of *figurative*: How can the concept of *figure*, and *contour* be grasped in music? What are their roles in terms of texture? How could these concepts work in music? In technical terms, I was very interested in the relation between figure/place³⁸—or figure/duration, in my musical considerations— as well as in the concept of *matters of fact* (p. 4), that might be understood, according to Deleuze, as 'coupled figures'—"coupling of sensations"—or "simultaneous figures" (p. 65). The former lies closer to the *visuality* whereas the latter feels nearer the music side, since a sense of simultaneity is used as a temporal idea.

In an even more subjective perspective, the concepts of sensation and resonance (p. 65–73) have strongly attracted my attention, since I could draw a link to my concerns about collaboration. In this way, and going straight into the composition of *Matters of fact*, I have established two levels for the following concepts:

- a) The resonance and sensation that materials (*matters*) can release by themselves
- b) The resonance and sensation that the *fact* (event) can perform over musicians

³⁸ "The relation of the Figure to its isolating place defines a "fact": "the fact is ...," "what takes place is" (Deleuze, 2003, p. 2)

This notion has had a logical consequence follows in my work: an active participation of the performer in the construction of the *form* could be conceived. As far as the concept of constructing *form* is concerned, Bacon's notion of *accident* makes absolute sense to me. As he exposed in his first interview (1962) with David Sylvester, Bacon had an extremely vague perspective about what he wanted to paint. He states that the final form was forged in the action and process of painting, like a real discovery. So, in what sense can form be an accident? "[...] Because I don't know how the form can be made." (Sylvester and Bacon, 1975, p. 11). It seems that in Bacon's mind there was no fixed image about what kind of forms his works could take on, and he was not aware of the targets of the evolution of his own creative process. He relied on following his usual routines, knowing that these might drive him to 'forming' things. In 1985, in another interview, this time in an episode of the TV programme 'The South Bank Show' conducted by the presenter Melvin Bragg, Bacon pointed out that it was while working that the virtual image grows. He did not sketch on canvas before the painting processes started, one of the main reasons being that by outlining before beginning to paint, objects might become a kind of mere illustration, rather than a figure as he conceived it. Despite not feeling the necessity to be in control of his painting at the stage of initial ideas, he admitted that "when the image seems to emerge, then ... to make it, you have to control it"³⁹. The meaning of the image was continuously changing. Bacon also pointed out that, in the creative process, the emergence of an image depended on both his sensibility and intuition, which does not mean that the general idea stayed hidden.

In this respect, I bore the concept of accident in mind when purposefully keeping my first intentions towards the composition of *Matters of fact* very vague. What spontaneously emerged from my preliminary explorations (improvisations) was immediately adopted as fragments to be joined together, this time in a deliberate and planned approach. The coupling of figures is another notion that I have retained from *Francis Bacon, The logic of Sensation*. In the specific case of *Matters of fact*, the coupling is given by the fragmentation of figures and subsequently juxtaposition and interweaving of these newly formed fragments which are indeed the *matters of fact* themselves. Conceptually

³⁹ Retrieved from <http://www.barnism.com/lwt-francis-bacon/>

speaking, this seems to be consistent, but the main issue arose concerning the ways this could be implemented in operative terms, and how I would bring temporal (simultaneity) and spatial characters to the 'facts' and 'matters'.

The notion of *contour* is particularly relevant in the conception of my piece. Deleuze (2003) states that Bacon paintings can be defined as a coexistence of tensions between three basic elements, namely "Structure, Figure, and Contour" (p. 32). This French philosopher also recognises the moving roles of the contour: "the contour appears as an isolator", "a deformer", ""depopulator" or the "deterritorializer"" (p. 32). All these changing functions depend on the perspective from which one can look at the relationships between structure and figure. Furthermore, the continuous movement of angles suggested by the contour act as a "[...] diastole and systole [...]" (p. 33) dynamic with consequence at each level, "The coexistence of all these movements in the painting. . . . is rhythm" (p. 33). The importance of these thoughts in the composition process of *Matters of fact* had implications on the way I dealt with the construction of the guitar part, since the function that I assigned to this instrument was to act as a *contour*. From my perspective, the composition of this part should adopt a radical attitude. The guitar has the task to draw clear profiles without taking into account any pre-established relationships with the music played by the recorder. As a result, I obtained an independent line tracing variable geometries throughout the composition. It follows the principles set out in Deleuze's functions which I mentioned earlier on.

3.3.1 Preliminary exploration with the Helder tenor recorder

As in other pieces for small chamber music format, my first approach to this work was carried out through instrumental exploration. In *Matters of fact* I went straight into investigating the multiple possibilities of this relatively new prototype of recorder, specifically designed for the expressive necessities set by contemporary music. One of the most remarkable innovations involves the production of both timbre and dynamics,

as well as the possibility of playing microtones. In comparison with the older models of recorders, timbre and dynamics can be managed in more flexible ways through the implantation of a special type of mouthpiece. As *fig. 3.5* shows the mouthpiece has removable pieces made in different qualities of wood, producing different qualities of timbre.



Figure 3.5. Helder tenor recorder mouthpiece.

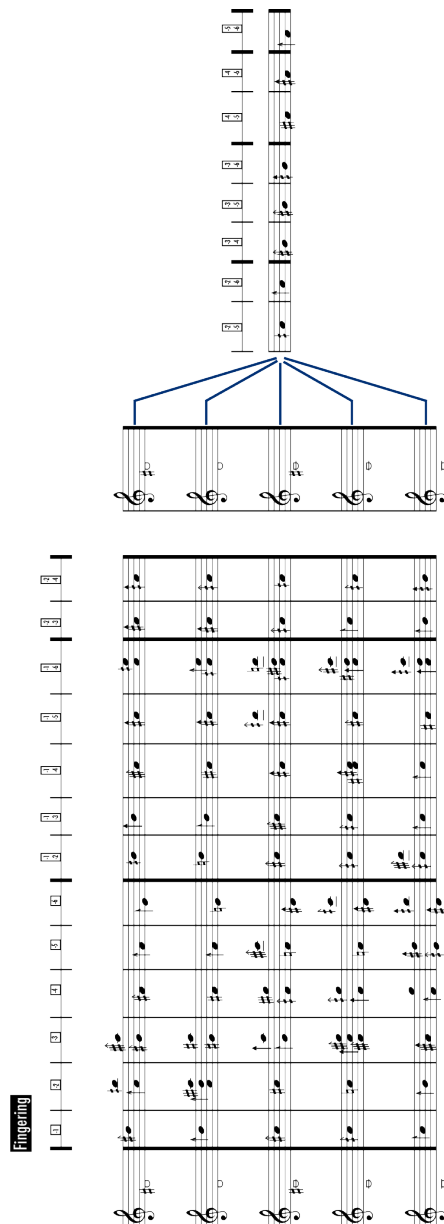
Figure 3.6 shows that the mouthpiece has a piece which can be moved by pressing with lips. This action allows the performer to gradually decrease the dynamic level so that it can play extremely soft sounds with diverse colours.



Figure 3.6. Controlling dynamics with the mouthpiece.

However, the aim of my exploration with the instrument was to uncover 'neighbouring-fingerings' to easily play microtones. Fingerings that are commonly used by recorder players are not necessarily close to each other, and results vary depending on the kind of recorders used. As the microtonal notation in my *Matters of fact* is very precise, I needed to create a system rendering in minute detail these non-conventional, successive fingerings. My findings in this respect have defined the physicality of the piece. As seen in the following picture (*fig. 3.7*), the fingerings have, as their basis, the lowest notes of the recorder B – C – C# – D and D#. In discussing this topic with Paola I could realise that the fingerings suggested for the microtones of this piece are very unusual among recorder performers. These actions tend to be carried out by one or two fingers. I have written such fingerings with negative numbers to represent the action of uncovering.

Figure 3.7. Fingering table for *Matters of fact*.



Despite the actual fingerings being organised in a successive way, resulting pitches are not entirely chromatic, meaning that the relations between pitch distances and successive fingerings are not linear at all.

3.3.1.1 Thoughts on the first collaborations

In this first step of the process, the collaboration with Paola Muñoz Manuguán aimed to show my initial inquiries on the Helder tenor recorder. These were not simple explorations, but as I have discussed earlier, they connected with gestural materials that I named '*figuras*'. Paola's contribution was fundamental since I was able to confirm the correctness of both the fingerings and the different positions of the mouth on the mouthpiece that I had been investigating. It is worth emphasising the unusualness of the fingerings as well as the results (pitch) they produced.

These first collaborations were developed within a teaching/learning dynamic where the fingering/gesture link was always maintained. Part of these meetings with Paola can be found in the following video: <https://youtu.be/u05YfJasfdI>

3.3.2 Initial inputs

In this exploration stage I recorded the results and then transcribed them using 'objects' (or functions) programmed in OpenMusic. The approximation to 1/16 of tone has been defined only by (audibly) comparing the resulting pitch with pitches produced by *BM-Microton*⁴⁰. But beyond the mere discovery of fingerings, this exploration led me to the conception of the main family of figures of this piece—named *Figuras 6* in this analysis (*fig. 3.8*)—that acted as first inputs in the compositional system. Actually, it was by writing sequences for 'minus-one-finger fingerings' (-6 to -1) that I have defined my first theme. In this notation, diamond notes represent the base fingerings.

⁴⁰ This is a Max/MSP interface created to play out pitch sequences from OpenMusic objects.



Figure 3.8. "Figuras 6" in Matters of fact.
Retrieved from my drafts.

However, this material stays in an 'inert' state so far; neither rhythms nor expressions have been set yet. Along with this first definition, I decided to invent more figures with the aim of creating different behaviours involving contrasting and fertile expressive ranges. Figures 3.9 to 3.13 show the drafts for five more figures (named *figuras 1* to 5) with different characters.

Figuras 1 (fig. 3.9), for instance, includes three subcategories (A-B-C) based on long *aeolian* sounds (diamond noteheads) with different closures.

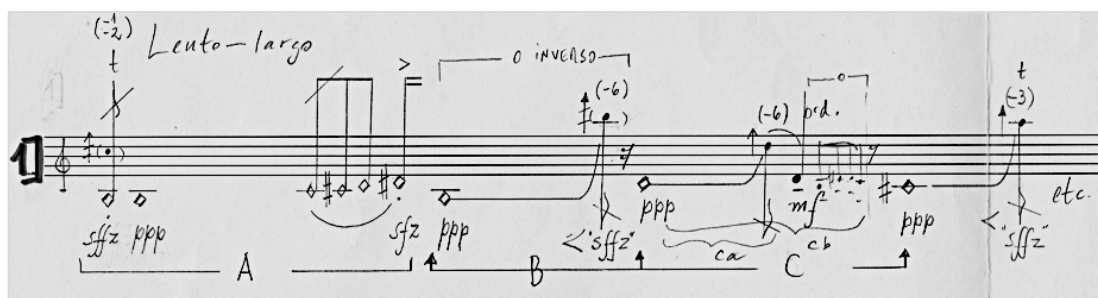


Figure 3.9. "Figuras 1" in Matters of fact.
Retrieved from my drafts.

Figuras 2 (fig. 3.10) features three kinds of articulations over *aeolian* short sounds: normal *staccato*; short *cresc-decresc*; phonemes issued from outside the mouthpiece.

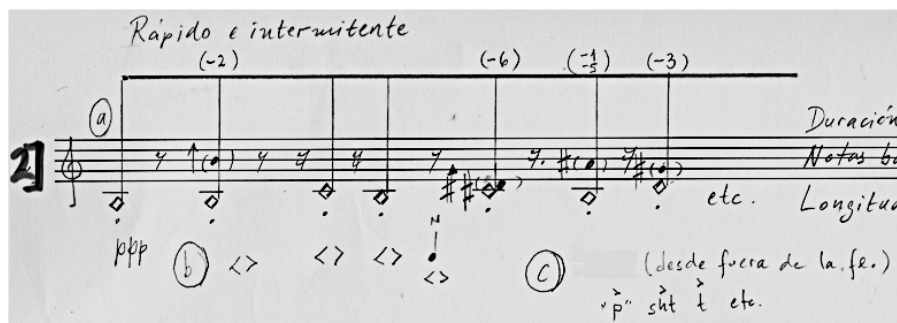


Figure 3.10. "Figuras 2" in Matters of fact.
Retrieved from my drafts.

(Watch the video at <https://www.dropbox.com/s/kms48to1mv88jwp/figuras2.mov?dl=0>)

Figuras 3 (fig. 3.11) includes two endings: simple note or multiphonics.

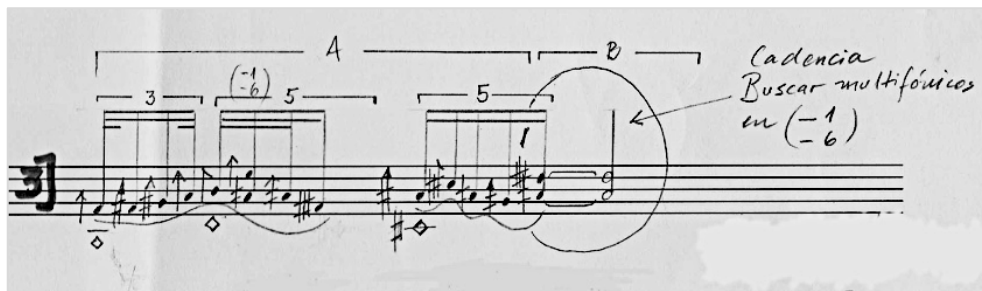


Figure 3.11. "Figuras 3" in Matters of fact.
Retrieved from my drafts.

Figuras 4 (fig. 3.12) includes only percussive semi-pitched sounds by tapping fingers.

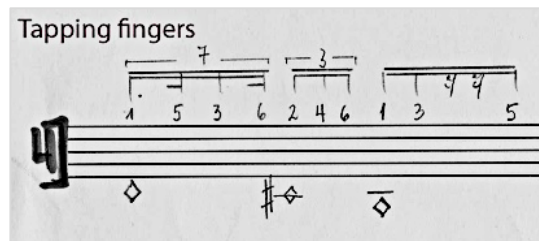


Figure 3.12. "Figuras 4" in Matters of fact.
Retrieved from my drafts.

(Watch the video at <https://www.dropbox.com/s/fz700qranbfakup/figuras4.mov?dl=0>)

Figuras 5 (fig. 3.13): as the illustration shows this is divided into three shapes based on what I have symbolically named *río* (river), consisting of rapid sequences of neighbour microtones with preceding and/or following elements added.

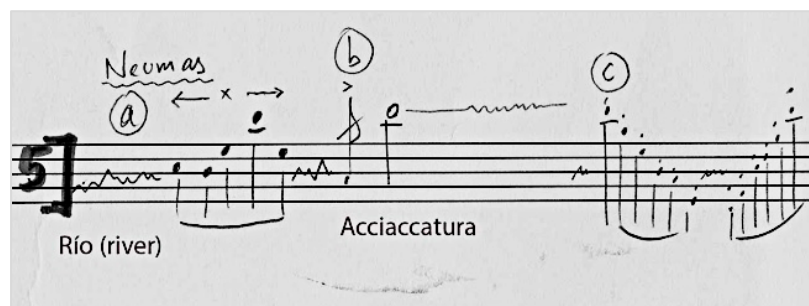
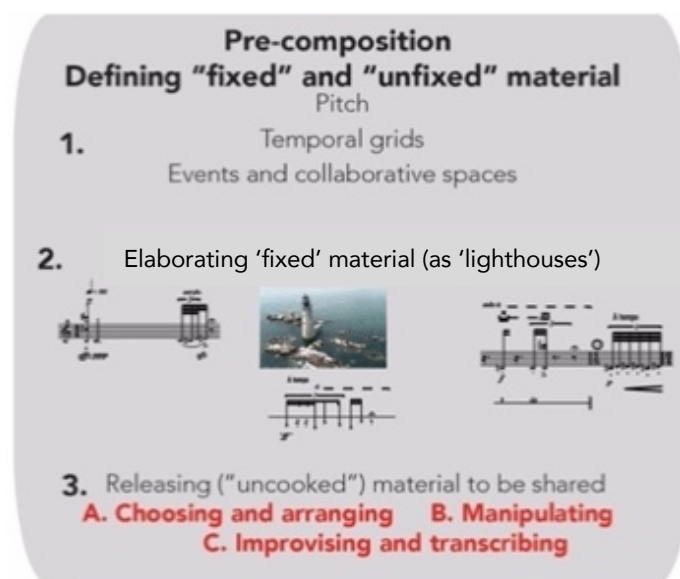


Figure 3.13. "Figuras 5" in Matters of fact.
Retrieved from my drafts.

3.3.3 Pre-compositional stage. Building material.

As *figure 3.14* shows, the first actions to implement at this stage are the generation of pitch sequences, temporal grids, and collaborative spaces. Secondly, I elaborate the 'lighthouses' (fixed material) by considering the first inputs described above. The third component of this stage is to deliver "uncooked" material for the performer to operate three kinds of collaborative tasks on a. Choosing and arranging; b. Manipulating; c. Improvising.



*Figure 3.14. Pre-compositional stage.
(see also fig. 3.3)*

3.3.4 Extracting a temporal grid from *Figuras 6*

Figure 3.15 shows the main OpenMusic patch for *Matters of fact*. The process features four stages:

- A. The temporal grid is conceived by using the interval content of *Figuras 6* (see fig. 3.8). This is achieved by similar procedures to the ones I refer to in Chapter 1 (algorithmic implementation in *Estudios automáticos*).
- B. The intervallic content of *Figuras 6* takes on temporal proportions within specific measured bars. This technique is similar to the one known as Time-Points⁴¹ (TPs). The particularity of this operation is that, though the 1/16-tone microtonal approximation was made, TPs are represented through a simplification of these intervals—in the frame of the equal temperament (1/2 tone or 100 cents).
- C. After obtaining the TPs for each of the 5 sub-sequences of *Figuras 6*, I perform an operation through which their elements come to be interlocked. The operation consists of grouping all the *n*th elements of each *figuras 6*, thus obtaining 6 groups of 5 notes each.
- D. Subsequently, the original *figuras 6*'s TPs are concatenated with successive interlocked sequences (see fig. 3.16). The resulting form is a sequence of different empty bars playing different roles in the structuration of the music.

⁴¹ Time-point system is a term of serial technique defined by American composer Milton Babbitt. The interval-content of a sequence (or dodecaphonic series, for instance) may be converted in time-points by equivalence, so that a pitch interval can become a time interval (Wuorinen, 1979, 130).

Figure 3.15. OpenMusic patch for Matters of fact. Three stages.

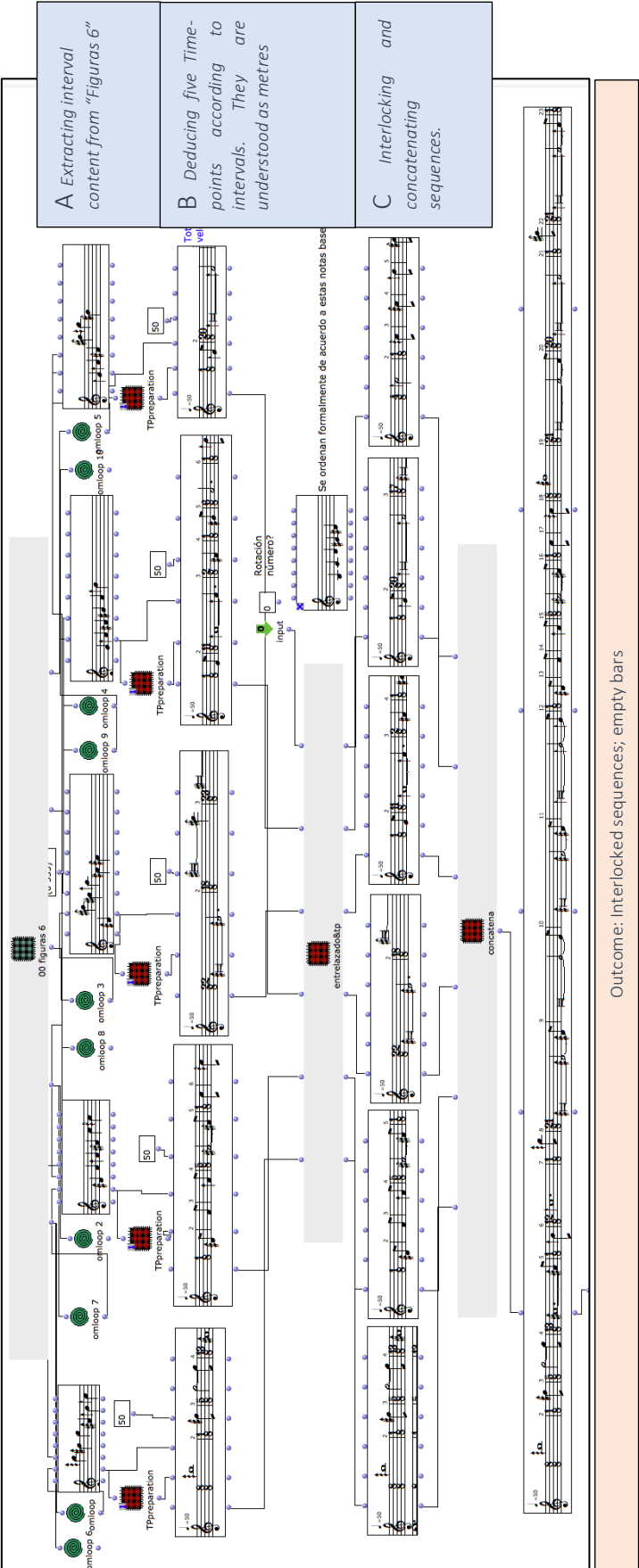


Figure 3.16. Successive interlocked sequences: time grid in Matters of fact.

The figure displays a musical score for the piece "Matters of fact", illustrating five successive interlocked sequences labeled figuras 6A through 6E. The score is written on a single staff with a treble clef and a key signature of one sharp (F#). The time signature is 4/4. The sequences are defined by brackets and numbered measures:

- figuras 6A:** Measures 1-11. A red bracket highlights measures 1-5, and a blue bracket highlights measures 6-11. The word "interlocking" is written below the staff.
- figuras 6B:** Measures 12-22. A red bracket highlights measures 12-16, and a blue bracket highlights measures 17-22. The word "interlocking" is written below the staff.
- figuras 6C:** Measures 23-33. A red bracket highlights measures 23-27, and a blue bracket highlights measures 28-33. The word "interlocking" is written below the staff.
- figuras 6D:** Measures 34-44. A red bracket highlights measures 34-38, and a blue bracket highlights measures 39-44. The word "interlocking" is written below the staff.
- figuras 6E:** Measures 45-60. A red bracket highlights measures 45-49, and a blue bracket highlights measures 50-60. The word "interlocking" is written below the staff.

The score includes various musical notations such as eighth notes, quarter notes, and rests. The measures are numbered sequentially from 1 to 60. The word "interlocking" is used to indicate the overlapping nature of the sequences.

This first ‘map’ has allowed us to visualise a distribution of notes representing a particular content linked to them. Hence, this distribution has an organisational function. For example, the B5 in the first bar of *figuras 6A* is not the pitch intended to appear but a symbol representing the following musical content (*fig. 3.17*):

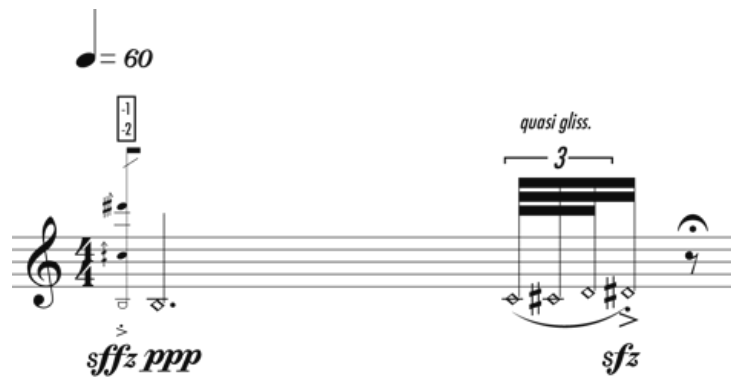


Figure 3.17. “Figuras 6A” in Matters of fact.

In this sense, the TPs that emerge from the five *Figuras 6* sub-sequences represent the spaces to place ‘lighthouses’. The entire first sub-sequence 6A, for instance, comprises a resorted array of *figuras 1* (*f1*) to *figuras 6* (*f6*) forming the first lighthouse (*fig. 3.18*).

The musical score for "Hinterland" by Michael Nyman is presented for Haider recorder and guitar. The score is divided into three sections labeled f_1 , f_2 , and f_6 .

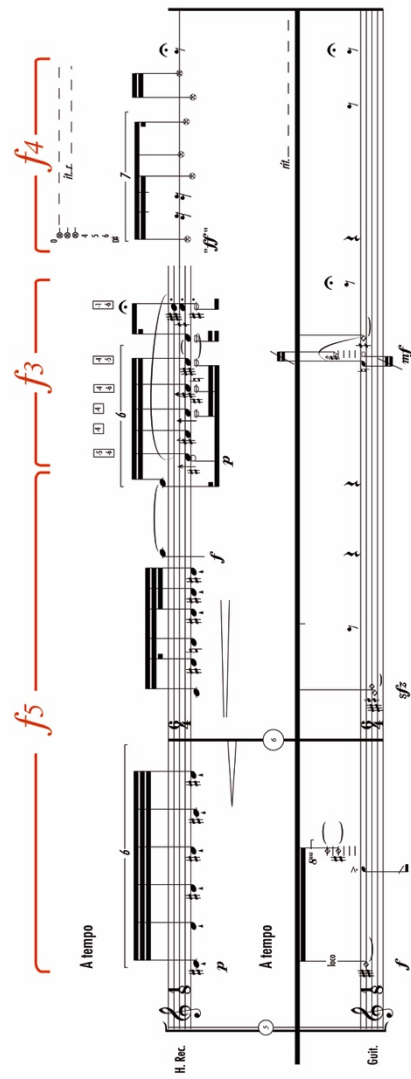
Haider recorder part:

- Section f_1 :** Starts with a treble clef, key signature of one sharp (F#), and a tempo marking of 60. The first measure is a quarter note G4 with a dynamic of *sfz*. This is followed by a triplet of eighth notes (G4, A4, B4) with a dynamic of *ppp*. The section ends with a measure of rest.
- Section f_2 :** Continues with a measure of rest, followed by a measure of eighth notes (G4, A4) with a dynamic of *ppp*. This is followed by a measure of eighth notes (G4, A4) with a dynamic of *ppp*. The section ends with a measure of rest.
- Section f_6 :** Starts with a measure of eighth notes (G4, A4) with a dynamic of *ppp*. This is followed by a measure of eighth notes (G4, A4) with a dynamic of *ppp*. The section ends with a measure of rest.

Guitar part:

- Section f_1 :** Starts with a measure of eighth notes (G4, A4) with a dynamic of *ppp*. This is followed by a measure of eighth notes (G4, A4) with a dynamic of *ppp*. The section ends with a measure of rest.
- Section f_2 :** Continues with a measure of eighth notes (G4, A4) with a dynamic of *ppp*. This is followed by a measure of eighth notes (G4, A4) with a dynamic of *ppp*. The section ends with a measure of rest.
- Section f_6 :** Starts with a measure of eighth notes (G4, A4) with a dynamic of *ppp*. This is followed by a measure of eighth notes (G4, A4) with a dynamic of *ppp*. The section ends with a measure of rest.

The score includes various musical notations such as notes, rests, and articulation marks. The dynamics range from *ppp* (pianissimo) to *sfz* (sforzando).



The remainder of the lighthouses are placed as follows in the score: lighthouse 2 (bars 14 to 18); lighthouse 3 (bars 26 to 31); lighthouse 4 (bars 40 to 45); lighthouse 5 (bars 53 to 58).

So far, I have explained how lighthouses were conceived; I have also shed light on their content and roles within the organisational grid. As mentioned above, this organisation includes, on the one hand, the distribution of the 6 principal figures acting as reference frames. On the other hand, an arrangement of interlocked pitches sequentially emerges from each of these figures. The following illustration (*fig. 3.19*) exposes the distribution ‘map’ in which principal figures and interlocking pitches are consecutively deployed.

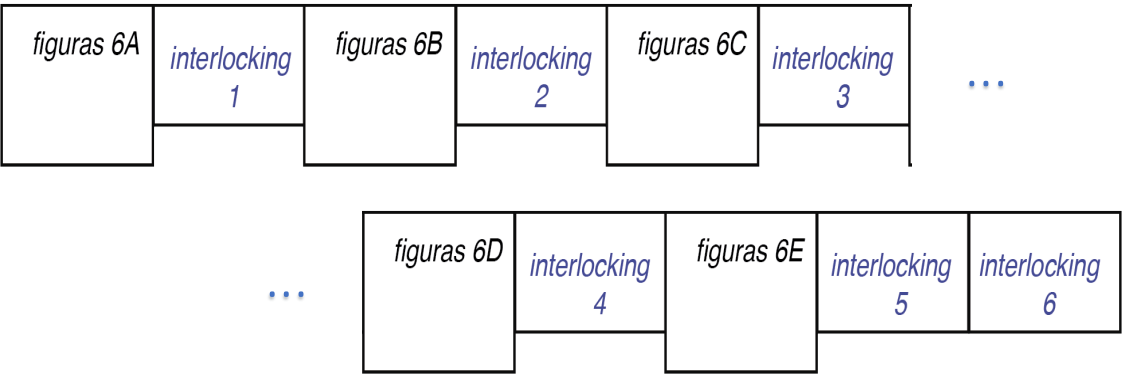


Figure 3.19. Distribution map in Matters of fact.

The tension between fixed and unfixed material is strongly characterised by these two organisational elements: while lighthouses represent fixity, the other category represents the places where interactions between materials from the lighthouses and the outcomes from collaborative appointments occur (unfixity). Despite the uncertainty of outcomes, I intend the grid to ensure a significant cohesion in terms of characterising behaviour. This is an important aspect since every interlaced element is a carrier of particular identities that interact with others creating and updating new syntaxes. There is a crucial connection here to the concept of recursion. However, beyond creating a re-entry system—referred to as a paradigm of recursion in computer sciences—my attempt has been to establish fundamental conditions for a self-reference mechanism. This is considered by many researchers in linguistics and logic⁴² as a category of recursion,

⁴² See Smullyan (1994) and Kauffman (1987), for example.

together with feedback, among others. A self-referential system works recursively through different indices or indicators, understood as pitch-symbols in my model. They create a link to particular meanings or contents and refer to something belonging to a certain context (Pareyon, 2011, pp. 96–97).

3.3.4.1 Implications in the musical form

Despite the technicalities of this stage, the tension between fixed components—and their position in time—with a still unknown material led me to reflect on the notion of form. First, the general shape of the piece would never be wholly predetermined, and its completeness absolutely depended on what emerged from the fixed/uncertain interaction implemented through various methods. Thus, the clarity of the multiple identities that would articulate the piece could only emerge after immersion in collaborative creative work with Paola: the content that pitch symbols (indicators) refer to depends on how a performer's qualities respond to different fixed materials. Here, some notions of both 'version' and 'open form' appear. Any work conceived under these guidelines would be open in terms of its form, but also subjected to different versions depending on the performer's musical qualities that determine their reactions to the proposed materials.

I will now examine how this self-reference frame works by adding the crucial creative collaboration link into my extended compositional workspace.

3.3.5 Collaboration. Embedding 'bifurcations'

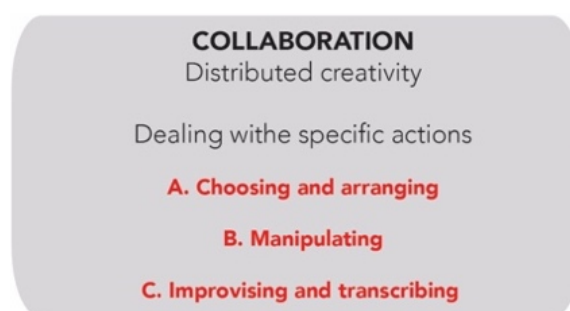
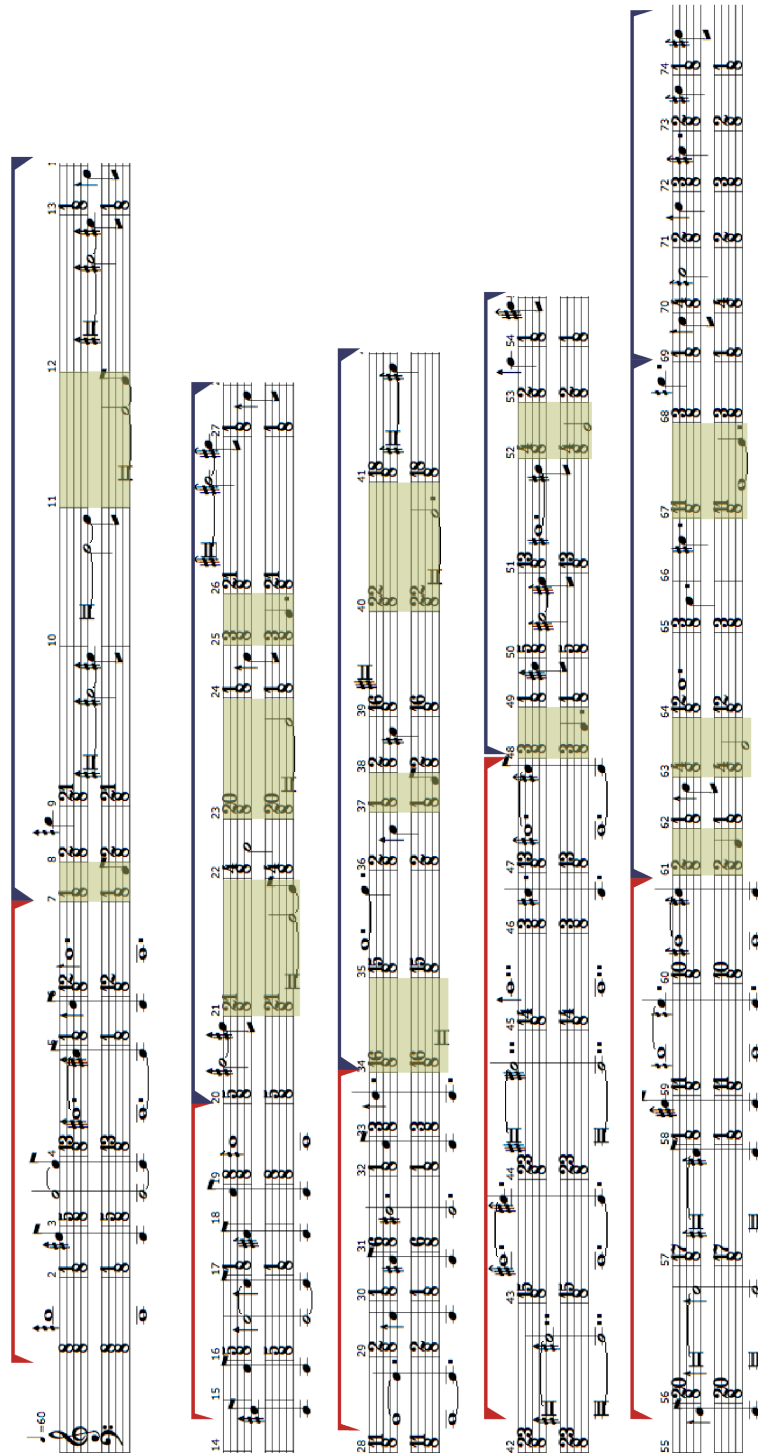


Figure 3.20. Collaborative stage (see also fig. 3.3).

‘Bifurcations’ are bars randomly allocated into the main temporal grid, serving as a platform for three types of collaboration. Collaborations can be seen as emergent material with musical content which affects the construction of the next bars. By adding collaborative ‘bifurcations’ the temporal grid becomes as follows (*fig. 3.21*):

Figure 3.21. Bifurcations embedded in the time grid of Matters of fact (coloured bars).



There is a total of 13 collaborative appointments embedded (coloured bars) in the main grid. Notes A^2 , F^2 , G^2 , are new indicators denoting three types of collaboration respectively: FIXING FIGURES; MUSICAL OPERATIONS; and IMPROVISATION. The first one is about decisions made by the performer: Paola was instructed to decide among several figures provided by my OpenMusic patches, so that her selection would fill the empty bars. At this point, the performer could theoretically opt not to fill them and leave them in silence. This decision has a direct impact on the composition of the following bars. It also influences the kind of material that will interact with those bars. The second kind of collaboration operates directly over an abstract material coming from the OpenMusic algorithms. They provide a 'neutral' (non-rhythmed) material. The operations that the performer can make stay in the realm of pitches, durations, timbre, dynamics, articulations, repetition, ornamentations as well as others which they choose to apply. Finally, in bars intended for improvisation, the performer is invited to improvise⁴⁴ to then transcribe her intervention into musical notation.

3.3.6 Interaction and self-reference as recursion

The expected interactions between lighthouses (fixed) and the outcomes of collaborative appointments relate to the idea of "coupled figures" and "simultaneous figures" (Deleuze, 2003, p. 65-69). This thread of thoughts led me to a series of musical operations such as a re-reading technique, mapping of elements, re-interpreting contents, transferring functions and qualities, permutation and interlocking structures. The challenge was to implement these operations so that the tension between participating materials would generate a polyphony of figures and, from another perspective, a 'double' presence of converging figures. According to the general plan, these interactions should determine adjacent bars. For example, the musical content expected to emerge in bars 8, 9, and 10 should be the result of interactions between the

⁴⁴ Regarding this action, the first idea that emerged was that the performer could decide what kind of interaction with the guitarist she wanted to develop. Interactions could take place as a *solo* (a sort of *cadenza*); *solo* with sudden 'interference' by the guitarist; live improvisation; or whatever she wanted to do. However, in consistency with my concept surrounding the separate construction of the guitar part, I opted to carry out a more constricted type of improvisation. I also created a link to the elements that were gradually brewing in order to maintain the 'figural' role of the flute.

collaborative outcome rising in bar 7 and particles of bar 1 (*f1*), bar 14 (*f6*), and bar 26 (*f6*), respectively.

With respect to aural features, the musical outcome depicts a self-reflective behaviour: the combination of different particles creates circular relationships and feeds perception with new elements. The operation takes particles of both ‘the past’ and ‘the future’ of the piece—both being already fixed as materials—to render ‘the present’, which denotes a non-chronological compositional attitude which might have repercussions on the way this music can be perceived. From my point of view, the aura released by the piece is that of a form whose events are strangely connect to each other. This reveals an important aspect of recursiveness: self-reference. Beyond the operative dimension, this finding means a major achievement in terms of my aesthetical search.

In the case of *Matters of fact*, the core of the recursion is actually the iteration of interactions described above. However, as Pareyon (2011, p. 94) points out, iteration in this context is different from repetition as parameters and operations change in every instance (p. 94). An isolated iteration can be illustrated through the following diagram (fig. 3.22):

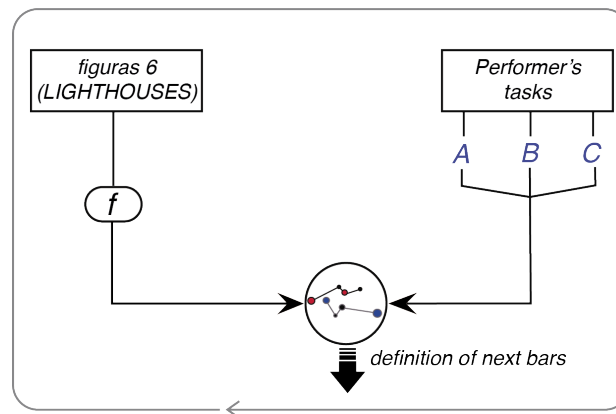


Figure 3.22. An isolated iteration of interactions between materials.

A particle (*f*) of *figuras 6* (A to E) and the outcome of tasks (A, B, or C) interact together to define the musical content of adjacent bars. This operation is iterated as many times as scheduled in the general plan (temporal grid).

3.3.7 Interactions between fixed/unfixed materials

The following tables (*fig. 3.23*) show how interactions were organised. The tables contain the six major structures and bars that participate in the interactions ('bifurcations' – Particles of figures → Adjacent bars defined).

I.

	Bifurcation	Particles of figures	Adj. bars defined
Bar number	7	1	8
		14a	9
		26	10
	11	40	12
		55	13

II.

	Bifurcation	Particles of figures	Adj. bars defined
Bar number		2	18
	19	14b	20
	21	27	22
	23	41	24
	23	54	25

III.

	Bifurcation	Particles of figures	Adj. bars defined
Bar number	32	3	33
		15	34
	35	28	36
		42	37
	38	55	39

IV.

	Bifurcation	Particles of figures	Adj. bars defined
Bar number	46	4	47
		16a	48
		29	49
	50	43	51
		56	52

V.

	Bifurcation	Particles of figures	Adj. bars defined
Bar number	59	5	60
	61	16b	62
		30	63
		44	64
	65	57	66

VI.

	Bifurcation	Particles of figures	Adj. bars defined
Bar number		6	67
		17	68
		31	69
		45	70
		58	71

Figure 3.23. Organisation of Interactions in Matters of fact.

3.3.8 Three examples of interaction

'FIXING FIGURES'

According to the general plan, bars 7 and 11 (see *fig. 3.21*) translate into the same type of collaboration. In both cases the performer must decide (and set) on the kind of figures

(*f1* to *f6*) that should be allocated to these bars. For example, in bar 7, Paola decided to use *figuras 2*⁴⁶ (type *staccato* phonemes), whilst in bar 11 she opted to reintegrate *figuras 1* (type aeolian sound with *acciaccatura* at the beginning). This decision also involved a previous process of embodiment in which Paola internalised the duration of the figure as well as the formal implications of her decisions. Unexpectedly, the outcome of this action marked a structural gesture in which a sort of suspended breath arose, a unique moment within the piece. I proceed to have a look at the interactions of bar 11. The plan prescribes that bar 11 ('fixing figures') must interact with bar 40 (*f1*) to define adjacent bar 12, and with bar 53 (*f2*) to define bar 13 (*fig. 3.24*).

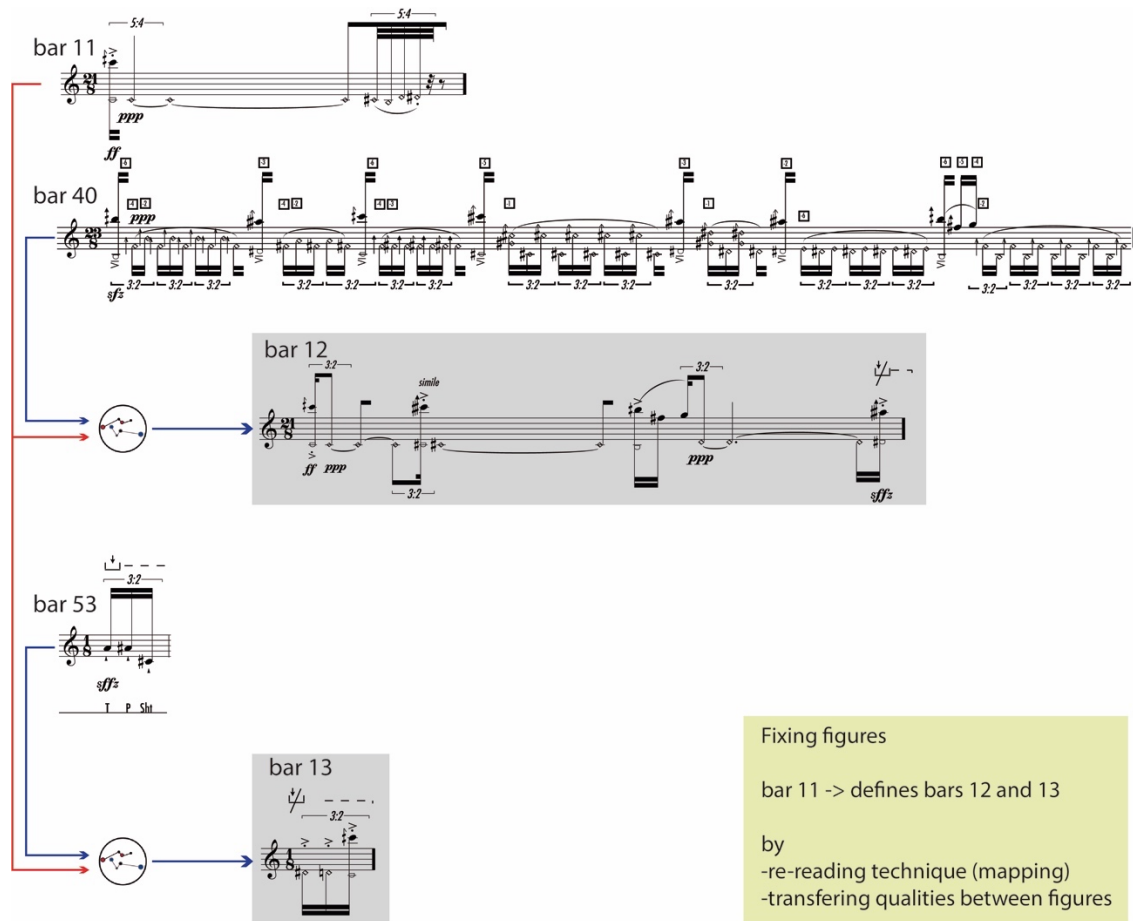


Figure 3.24. Interactions between materials: "fixing figures", in Matters of fact.

Figure 3.24 also shows that these 'hand-made' operations preserve the profiles of materials to different extents. The interaction between bar 11, containing essentially

⁴⁶ See 3.3.2 Initial inputs

fragments from f1, and bar 40, carrying a modified version of f1, results in a figure highly 'contaminated' with the essence of f1. The re-reading process consists of writing bar 40 by reordering its higher sounds following the sequence of notes of bar 11 as pointers. At the same time, the continuous motion that characterises bar 40 is somehow transferred across to the 'surface' of bar 11. In a distant pattern, the interaction with bar 53 was achieved by a simple transfer of qualities, so that the new figure takes over both the staccato from bar 53 and the aeolian sound and its high pitch from bar 11, preserving thus the main characteristics of both at 50%.

MUSICAL OPERATIONS

In this example I show results of the decision made in bar 19 by Paola (*fig. 3.25*). This is the first of three 'musical operations' scheduled into the temporal grid. The computer supplied the following (uncooked) material for her to freely operate with on various levels. The sole constraint was the metric measure. It determines the character of the passage by considering the relationship between bar and distribution of notes over time.



*Figure 3.25. "Musical operation" in bar 19 in Matters of fact.
(Watch the video at <https://youtu.be/3-1C3zINARQ>)*

Paola focused on rhythmic elements. First, she tried to stay true to the fastest part⁴⁸ of the given sequence in the manuscript. She did not write rests but made two longer sounds to create contrast with shortly articulated notes. However, from my viewpoint,

⁴⁸ It is important to say that such fragment was accidentally kept in the manuscript. My intention was always to neutralise the notation of rhythm in order to carry out my idea of raw material.

the most interesting effort was made in the area of expression and also her attempt of reintegrating elements from *f3* (*legato*, for example). In this way, by combining articulations, dynamics, rhythms and sounding qualities, Paola created a valuable new figure which was immediately embodied. A novel contribution was the embedding of overblowing sounds; a trace of her which I then reintegrated into my own procedures.

Interestingly, this is the nearest aspect to the re-entry category of recursion. The elements from previous states of the musical materials are not only ‘reinjected’ into mind and body of the performer, as an individual cognitive system; they also flow into the ecology of the extended system that includes Paola’s agency, the computer and the composer. In fact, the recursive system is activated through the interaction of all three agencies at different degrees (on different levels) with a variety of operations and tools.

The grid established that this first ‘musical operation’ ought to interact with particles of bar 14 (*f6*) to define bar 20. In this respect, I first transcribed the material⁵⁰ created by Paola into bar 19 (in 21/8) to obtain some clearer details of the outcome (*fig. 3.26*).

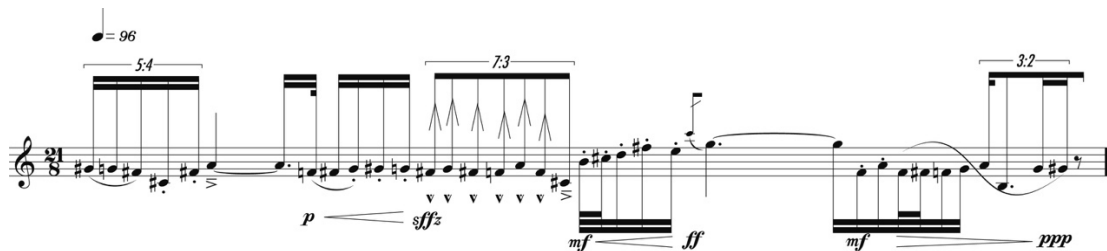


Figure 3.26. Transcription for ‘musical operation’ of bar 19 in *Matters of fact*.

⁵⁰ AUDIO FILE 4 <https://www.dropbox.com/s/gy0nevz7gu1s0by/M19%20Transcription.aif?dl=0>

In the interaction with bar 14 I made two operations: 1. Substituting the first part of bar 14 by a different fragment of *f6*; 2. Transferring the overblowing sound to the last part of bar 14 (*fig. 3.27*).

bar 19

bar 14

bar 20

Music operations

bar 19 -> defines bar 20

-Considering rhythm, timbre, and articulations.

Figure 3.27. Interaction between music operations in bar 19 and bar 14 in *Matters of fact*.

IMPROVISATION

Regarding collaborations of type IMPROVISATION, the following example illustrates the transcription of the improvisation (bar 32) performed by Paola. Also, the image shows how this improvisation has influenced the construction of the next two bars (33 and 34) (fig. 3.28). <https://www.dropbox.com/s/gbpllnq67dj4h48/M32%20Transcription.wav?dl=0>

Figure 3.28. Interactions between bars 32/3 and 32/15 in *Matters of fact*.

Improvisations provided new valuable sources of expression and material to the piece. This particular performance by Paola reveals her focus on ‘improvising with’ known elements as well as on generating novelty. In the first part, in fact, Paola improvised with elements coming from the original figures (recurring pitches, for instance). However, the

perception of pitches themselves tend to blur by incorporating a '*frullato*-veil' that becomes darker at the end, when the gestural speed increases.

The results of interactions seem very clear, however, in this specific case, the operations were initiated in a more subjective (irrational) way. The *f1* fragment from bar 3 pervades the improvisation in such a way that its original configuration substitutes the first part of Paola's creation, whilst the overblowing gesture takes place in the middle of the new figure. The other interaction scheduled was bar 32 with bar 15, a short *staccato* gesture based on *f5*. The new figure shows a balanced distribution of *frullato*, which substitutes the *staccato* on beat 1 in bar 15, and an overblowing fast gesture articulated with the original *staccato* from bar 15. The extreme *crescendo* acts as a common feature between both materials in interaction.

3.3.8.1 Fixing figures – Musical operations – Improvisation: conclusions

The three types of collaboration scheduled on the temporal grid were thought of as strategies to stimulate creative responses by Paola to the presentation of pre-established materials (lighthouses). These tasks also served as a self-guide to understand the gestation of the work as well as a fundamental input for its execution. The micro and macro components that resulted from the interaction between contributions of the performer and the given material were conceived through an embodiment process of such elements.

Another aspect to be considered is that the self-similarity of the material is understood and assimilated not only from such corporeality but also as a formal quality. Here I stress the importance, for my project, of understanding the musical form as something mutually constructed and written.

While one of the specific facets of recursion raised in *Matters of fact* relates to the definition of a bar as a result of interactions developed in the preceding ones, the aural features come as latent states of materials that project their converting dynamically. Simultaneously, they actively connect the past, present, and future of the listening.

The success of Paola's participation in the process of writing the work was due not only to her high command of instrumental technique—particularly of the Helder tenor flute—but also to her high capacity for creative reaction to tasks that I proposed. Her vast imagination and the physicality of her responses were of exceptional advantage, as the piece gained local (gestural) and general (form) flexibility. The improvisation expected in bar 32, for example, became a constant shadow (constraint) in decision-making actions for both my domain and for hers.

3.4 *Tragic Duet* (2017), for flute(s) and recorder(s)

The piece was premiered by Karina Fischer (flute) and Paola Muñoz Manuguán (recorder) —Movimiento Paralelo ensemble— in November 2017 at the Universidad Católica de Chile—XXV Contemporary Music Festival, at GAM, Santiago de Chile. In September 2016 I had the fortune to visit the double exhibition *Francis Bacon: Invisible Rooms*, at TATE Liverpool. Major paintings of Bacon and Maria Lassnig were exhibited. *Tragic Duet* draws its inspiration from three paintings by Maria Lassnig: *Tragic Duet/Dramatic Duet* (1987), *With the head through the wall* (1985), and *Two figures in the green* (unknown date). The first one encompasses a certain fiction described by two bodies inside/outside a white frame (canvas), and, like in the other two paintings, there are always two framed figures with more or less symmetrical roles and actions. The figures can be interpreted as an attempt to represent the body in relation to the paradox of reality and fiction.



Tragisches Duett/Dramatisches Duett, 1987, by Maria Lassnig

Oil paint on canvas, 200.1 x 205

(retrieved from

<https://ocula.com/art-galleries/hauser-wirth/artworks/maria-lassnig/tragisches-duett--dramatisches-duett-tragic-d/>)

In her painting titled *Sciencefiction* (1963), Lassnig installs the frame inside the canvas, as a fictional device. Magritte uses a similar technique in *La condition humaine* (1933) and *Les deux Mystères* (1966), however he sets it in a context of obvious obstruction. From her series *Inside and Outside the Canvas* (made during the 1980s) "Lassnig varied the theme of the picture within the picture through different interactions between figure and canvas." (Fricke, 2016, p.108). In *Tragic Duet/Dramatic Duet*, paradoxical images describe a new variation of the main double issue: 'the fictional' against 'the real'. Two figures rest spread out over a white canvas (or bed sheet?). On the right side, there is a body that seems to be lying in foetal position, whereas the figure on the left side is trying to manipulate it with an unknown agenda. The tragic aspect of the duet is insinuated in the painting: Lassnig expresses an interrogative attitude towards the creative process. She seems to reveal a self-representational interest to transgress the canvas into the canvas (fiction?) acting from the outside (reality?). However, through this paradox Lassnig carries out some kind of retroaction over herself, which leads into a liminal interrogation tensioned by the idea of *Inside and Outside*. The implicit 'self-textuality' herein activates redundant meanings and, certainly, a sense of recursiveness that twists and updates the role of the artist as well as her artistic intention (message): is the liminal question perhaps an intricate (looping) self-questioning about the limits of the canvas identified with the limits of the body?

3.4.1 First inputs and ideas: exploration, improvisation, recording

Similarly to *Matters of fact*, the first impulses that the piece received were delivered through explorations made particularly on the Paetzold contrabass F recorder (*fig. 3.29*), an instrument I was already familiar with. The Paetzold prototype presents very different qualities in relation to traditional recorders and even compared to the Helder model. The mouthpiece, for instance, is more comparable to a short tube than the traditional *bec* (beak). The instrument is constructed with special left and right-hand keys which inhibit flexibility when it comes to the production of microtones.



Figure 3.29. Paetzold contrabass recorder (personal picture).

However, it is possible to play microtones by a combination of left-hand fingerings (C^3 to G^3) and actions over the labium with the index finger of the right hand (open to close). Additionally, the Paetzold recorder offers a wide range of colours and articulations which are strongly amplified by the body of the instrument. These are, among others, overblowing sounds, slaps, double *staccato*, and multiphonics. In my exploration I discovered a way to produce *whistle tones*, similar to the effect that can easily be created on the flute. Normally, this sound can be achieved through a combination of low air pressure and closed labium, but the result is very different in comparison to the one I wanted. My first intention was to create a strong similarity, in terms of timbre, with the flute's *whistle tones*. The effect is particularly suggestive as, it structurally defines significant elements of one of the seven principal figures supporting the piece.

Nonetheless, my exploration was more motivated by the necessity of establishing sounding interactions between the two instruments such as beats produced by two nearby pitches, blurring effects produced in playing interweaving textures and articulations, combinations of colours, etc. From this starting point, in my first improvisations I tried to explore the kind of interactions described above. Since I did not have a bass flute with me I first recorded a long melodic line with the Paetzold recorder tuned at its normal pitch. I then improvised over the first recorded line with the same

Paetzold recorder but tuned a quarter tone lower⁵³. The analysis of this recording led me to write the introduction of the piece⁵⁴ which is the first input intended to interact with other materials.

As can be seen on the score, in terms of pitch distributions the piece starts with clear gestures around C³ (both instruments transpose an octave lower—in the manuscript the Paetzold recorder is written in G clef). The Paetzold recorder should be tuned a quarter tone lower.

3.4.2 Harmonic map

One of the most critical needs that I could observe throughout the compositional process of *Tragic duet* was trying to relate orderly the physical gestures of the elements found in my explorations to the long-term formal gesture. The latter was born from the idea of gradually using the various flutes and recorders, that is, coming from the lower instruments that Karina and Paola had. Thus, I proceeded to conceive a harmonic profile as a general gesture. Much of the formal gesture in this work follows the following general harmonic map based on a symmetric 7-note chord where D⁴ is the axis (*fig. 3.30*).



Figure 3.30. Symmetric 7-note chord in Tragic duet.

⁵³ The Paetzold contrabass recorders have up to three pieces specially made to enlarge the size of the body producing lower tunings. An excerpt of this improvisation can be listened to at <https://www.moralesossio-composer.com/chapter-3-audio-and-video>

⁵⁴ See first page of the score

Subsequently, the intervals contract proportionally within the notes of the original symmetric chord acting as bounds, obtaining seven sub-fields (see red notes in *fig. 3.31*). This operation creates smaller intervals, which explains the use of quarter tones. In fact, this is a more operational recursion approach. As a matter of fact, I used to organise my harmonic material in this almost fractal way as a global upward gesture that marks the harmonic process of the work. This the reason why the score instructs the performers to change their instruments according to the required registers (bass flute – alto G flute – flute / Paetzold contrabass F recorder – bass recorder – alto recorder).

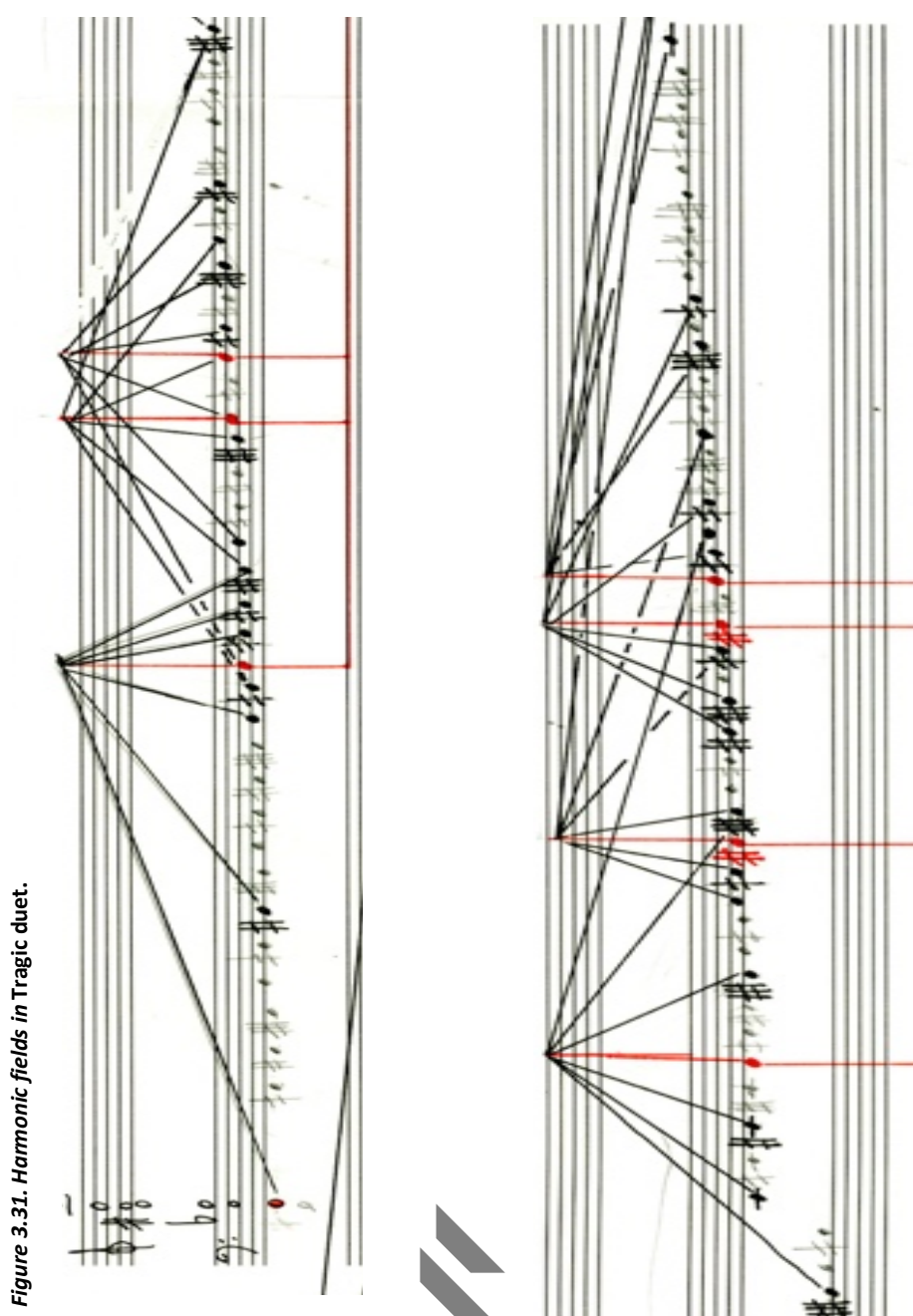


Figure 3.31. Harmonic fields in Tragic duet.

3.4.3 Seven figures

In my *Tragic duet*, the concept of fiction connects with the construction of particular figures that hold different formal roles. These are defined through interaction with collaborative actions, in a similar way to my approach in *Matters of fact*. Firstly, the two flutes play a complementary role, defining a "fictional" object that creates a blurring situation in terms of both rhythm and harmony. The following images (figures 3.32 to 3.38) show the drafts that I made for the seven figures articulating the general form of *Tragic duet*.

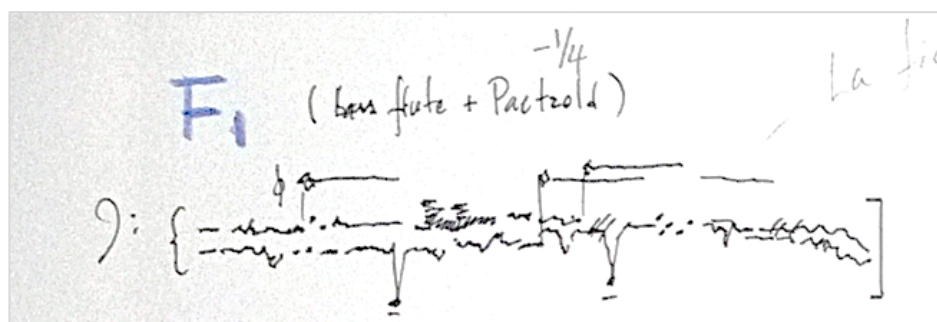


Figure 3.32. Tragic duet, F1.

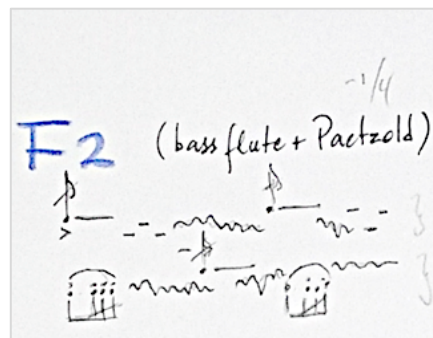


Figure 3.33. Tragic duet, F2.

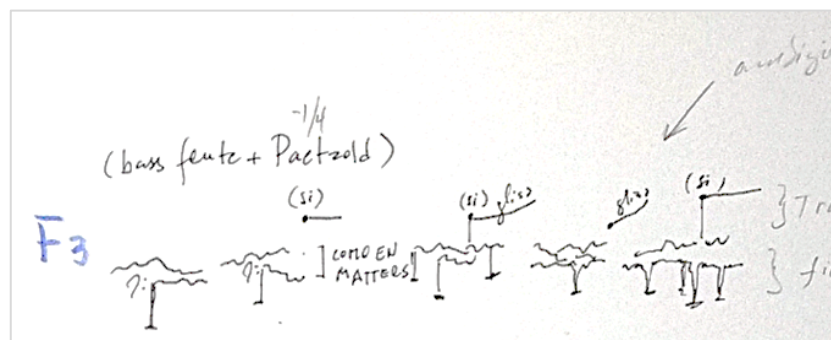


Figure 3.34. Tragic duet, F3.

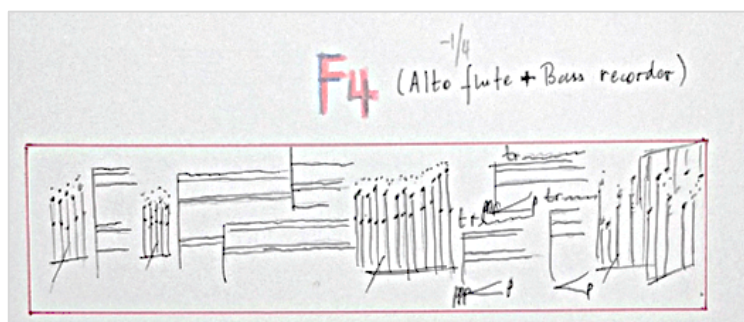


Figure 3.35. Tragic duet, F4.

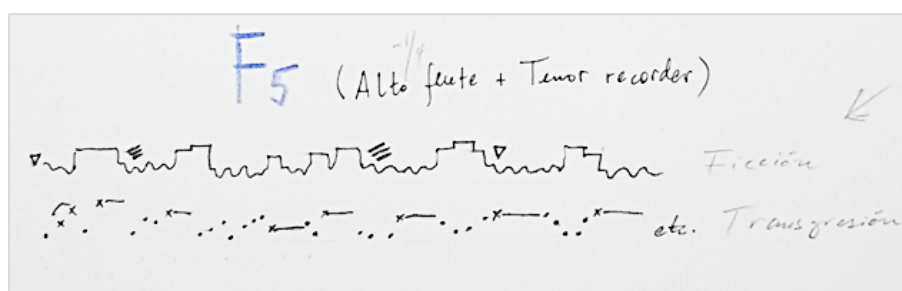


Figure 3.36. Tragic duet, F5.

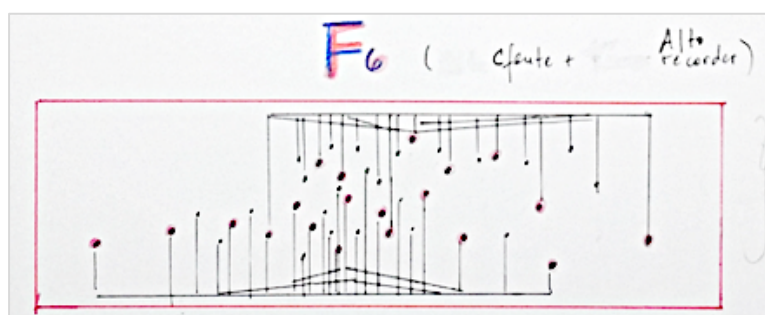


Figure 3.37. Tragic duet, F6.

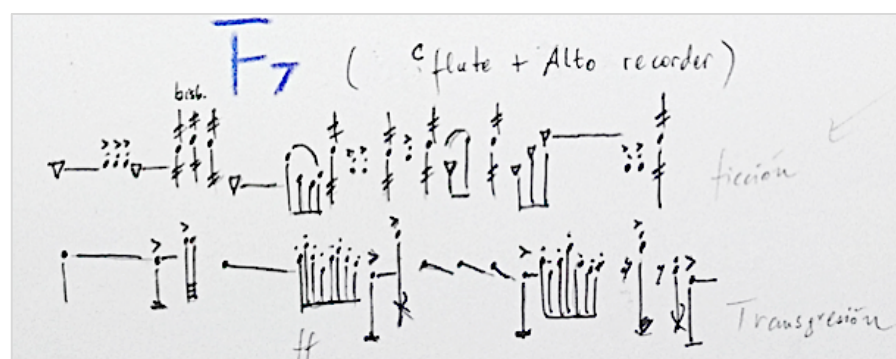


Figure 3.38. Tragic duet, F7.

Here, the concept of 'fiction' is applied from an abstract perspective. The definition of 'fiction' is understood as figures of relatively homogeneous and recognizable behaviour, while other figures, of more diffuse and blurred behaviour, tend towards the vagueness of the attempt to transgress the fictions and their limits. Both instruments share such roles by interchanging them.

F4 and F6 (bars 52-60 and 76-89, respectively) present more stable behaviours which, in my process, represent my compositional interpretation of fiction. However, F1 (bars 5-9) has been conceived exclusively to project its inner features over the rest of the piece. F4 and F6 can be considered as "closed fictions", meaning that their particularities are not generally present throughout the piece; they are merely punctual occurrences. The conception of the remaining figures (F2, F3, F5, and F1) is directly linked to the painting *Tragic Duet/Dramatic Duet* and its ambiguity between fiction and 'something' that transgresses it. Though the flute represents the escapist desire in my piece, the instrument still maintains some characteristics of fiction. At the same time, however, the flute also releases other original qualities conflicting with the concept of fiction. Complementary, the recorder deploys the 'becoming' of fiction, but, at the same time, this instrument increases its presence throughout the piece.

3.4.4 Distribution plan

Following the example of *Matters of fact*, I generated a temporal grid in which I allocated my seven principal figures (lighthouses) and points of collaboration (*fig. 3.39*). Diverse time proportions (understood as measured bars) were calculated through the equivalence interval/time (time-points). In this case, rather than having the first lighthouse at the beginning I decided to precede it by an introduction, a written version of my improvisation: the initial input.

There are, however, significant differences between the grid in *Matters of fact* and the one in *Tragic duet*. For example, in the former the interactions affected the definition of the following bars; in the latter I considered the repercussions that interactions, as well as the lighthouse's fragments, can have into the 'past' and 'future' of the piece. As shown

in *fig. 3.39*, the definition of bar 13 depends on interactions between bar 10 (collaborative action based on “Music operations” considering *f1* (*bar 6*) material) and *f7* (*bar 98*). *F7*, in turn, is defined by “Music operations” (M.Oper. in *fig. 3.39*) occurring in bar 97, which inherits the referential content from bar 96. Another relevant difference with the grid for *Matters of fact* is the placement of two independent figures (*F4* and *F6*). As stated above, these are independent materials whose particles have internally been conceived but they do not affect the generation of ‘external’ materials since they have not been distributed over the grid.

Figure 3.39. Organising circulation, non-chronological composition, and recursion in Tragic duet.

The figure displays a musical score for a piece titled "Tragic duet". The score is organized into seven distinct sections, labeled F1 through F7, which are arranged in a non-chronological sequence. Each section is represented by a staff of music with various annotations and markings.

- Section F1:** Starts with an "INTRO." marking. It includes a "Fix fig." (fixed figure) and a "M. Oper." (musical operation) marking. The section is annotated with "f1 (b.5)", "f5 (b.66)", and "f7 (b.96)".
- Section F2:** Includes a "Fix fig." and a "M. Oper." marking. It is annotated with "f3 (b.34)".
- Section F3:** Includes a "Fix fig." and a "M. Oper." marking. It is annotated with "f2 (b.18)", "f3 (b.35)", "f2 (b.19)", "f3 (b.36)", "f2 (b.21)", and "f3 (b.37)".
- Section F4:** Includes a "Fix fig." and a "M. Oper." marking. It is annotated with "f3 (b.39)", "f2 (b.24)", and "f3 (b.41)".
- Section F5:** Includes a "Fix fig." and a "M. Oper." marking. It is annotated with "f2 (b.25)", "f3 (b.42)", "f1 (b.7)", "f5 (b.70)", and "f7 (b.99)".
- Section F6:** Includes a "Fix fig." and a "M. Oper." marking. It is annotated with "f2 (b.26)", "f3 (b.43)", and "f1 (b.8)".
- Section F7:** Includes a "M. Oper." marking. It is annotated with "f7 (b.100)", "f1 (b.9)", "f5 (b.72)", and "f7 (b.101)".

Throughout the score, there are various markings such as "Dir." (direction), "Imp." (improvise), and "f" (forte). The score is also annotated with "f1 (b.5)", "f5 (b.66)", "f7 (b.96)", "f3 (b.34)", "f2 (b.18)", "f3 (b.35)", "f2 (b.19)", "f3 (b.36)", "f2 (b.21)", "f3 (b.37)", "f3 (b.39)", "f2 (b.24)", "f3 (b.41)", "f2 (b.25)", "f3 (b.42)", "f1 (b.7)", "f5 (b.70)", "f7 (b.99)", "f2 (b.26)", "f3 (b.43)", "f1 (b.8)", "f7 (b.100)", "f1 (b.9)", "f5 (b.72)", and "f7 (b.101)".

The previous figure summarises not only how different materials interact to determine the shape of a particular bar; it also reveals a non-chronological compositional gesture, perhaps more accentuated here than in *Matters of fact*. *Figure 3.39* also shows three types of generative situations where the first two can combine with each other:

- a. Bars are affected by the interaction between their own origins (*f1*, *f2*, *f3*, *f5*, and *f7*) and collaborations that occurred in previous bars (thin arrows below the staff). This situation is valid to generate material within the lighthouses, too.
- b. Bars that inherit the pitch and/or rhythmic content of fragments from the lighthouses, placed in previous or successive bars (thick arrows over the staff).
- c. Bars that directly (dir.) take the musical content from lighthouse material, without mediation of neither interactions nor collaborations (for instance bar 27, which adopts the musical content of *f2* [*bar 18*]).

In relation to the first situation I could say that, except for the first lighthouse (*f1*), the rest of them are not completely settled, since a significant part depends on 'internal' collaborations interacting with fixed fragments. From my point of view, this means a further implication of collaborative work since those routines are intended to generate not only the in-between spaces (lighthouses), but also the missing fragments of lighthouses. This extends the generative idea about the role of performers in the musical writing process.

3.4.5 Collaboration and recursion

Creative collaborations are characterised by the same three types of actions implemented by performers in *Matters of fact*, namely 'fixing figures', 'musical operations', and 'improvisation'. Recursive patterns, however, are structurally different. While in *Matters of fact* recursiveness results in a self-reference form and, to a certain

extent, as a re-entry system within cognitive and eco-social dynamics, in *Tragic duet* I maintain the latter and I add a more complex mechanisms of recursion. Now I proceed to analyse a couple of cases to illustrate this.

EXAMPLE A: Writing bars 2, 3, and 4 (fig. 3.40)

The improvisation required in bar 1 must consider two references: INTRODUCTION (fig. 3.41) and *f1* (bar 5) —see fig. 3.42—, which was previously written. The next three bars (2–4) are defined by interactions between the outcome from the IMPROVISATION and *f1*, *f5*, and *f7*, respectively. These operations update and anticipate somehow the identities of those pre-established materials (F1). The following illustrations show the process and the musical materials involved (fig. 3.40–3.44).

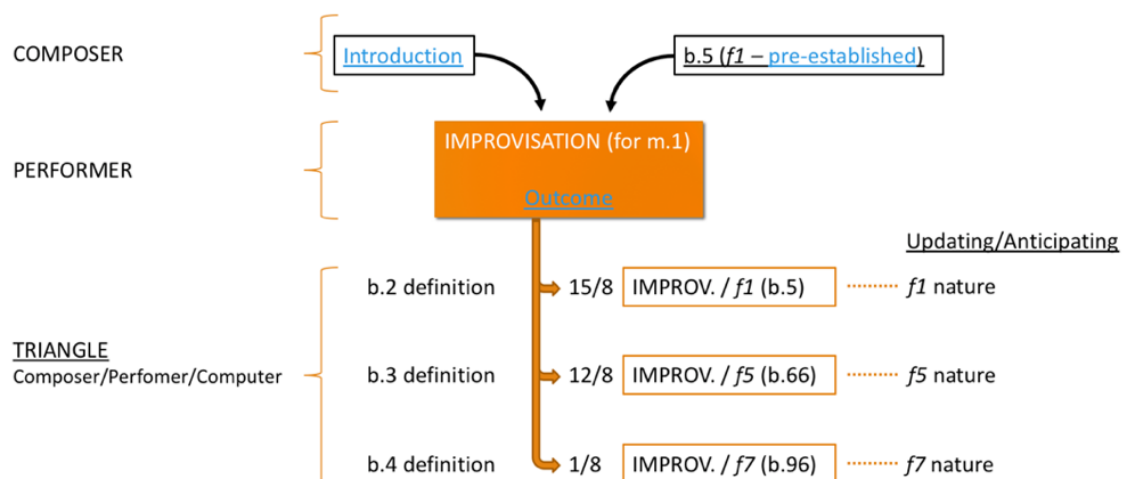


Figure 3.40. Recursive process for definition of bars 2, 3, and 4 in *Tragic duet*.

Figure 3.41. Tragic duet; Introduction.

<https://www.moralesossio-composer.com/tragic-duet->

Tragic duet
Cristian Morales Ossio
Huddersfield (2017)

to Karina Fischer and Paola Muñoz Manuquín
Pauitzold contrabass recorder

Duration: ca. 16 minutes

Lento e flessibile. (45 - 60 sec.)

bar 5 (*f1* - pre-established)

5

♩ = 42

6 8 7

Bass flute

smorz.

mf

ppp

W.T.

frull.

5 3

ppp

W.T.

7

frull.

p

Paetzold

Whistle

mf

ppp

5

5

sf

Whistle

7

7 3

ppp

f

5

p

Figure 3.42. Tragic duet, bar 5.

bar 1 (*transcribed improvisation*)

♩ = 48

4 8 3

p

f

smorz.

p

smorz.

mf

p

f

smorz.

Obfw.

Figure 3.43. Tragic duet, bar 1 (*improvisation*).

Figure 3.44. Interactions between Improvisation and f1 (b. 5), f5 (b. 66), and f7 (b. 93) in Tragic duet.

See https://www.moralesossio-composer.com/example-a_for_audio_samples

The score is divided into three main sections, each corresponding to a specific note (f1, f5, f7) and its associated improvisation. The sections are marked with red brackets and numbered 1, 5, and 7.

- Section 1 (Bar 1):** Labeled "bar 1 (transcribed improvisation)". It shows the initial improvisation for f1. The tempo is marked as $\text{♩} = 48$.
- Section 5 (Bar 66):** Labeled "bar 66". It shows the improvisation for f5. The tempo is marked as $\text{♩} = 42$.
- Section 7 (Bar 93):** Labeled "bar 93". It shows the improvisation for f7.

The score includes staves for Bass flute, Piccolo, Alto flute, and Tenor recorder. The improvisation is marked with *improv.* and *transcribed*. The score also includes dynamic markings such as *mf*, *f*, *p*, *ppp*, and *fff*.

EXAMPLE B: “Music operations” in bar 10

The collaborative appointment of bar 10 prescribes “musical operations” to be carried out by the performers. According to the plan, in *f1* (bar 6) the system must provide pitch material for performers to shape and embody a new figure:

6

Figure 3.45. Bar 6: referential material in Tragic duet.
<https://www.moralesossio-composer.com/example-b>

f1 (bar 6) pitch material is shown in the following figure:

Bass flute



Paetzold



Figure 3.46. Pitch material for bar 6 in Tragic duet.

The new pitch material to consider in the collaboration is actually a transformation from the original *f1* (bar 6):

Figure 3.47. Transformed pitch material for collaboration in Tragic duet.

After various improvisations with this material which performers should fit in a 3/8 bar, Karina and Paola issued the following outcome:



Figure 3.48. Decision made for a new figure in bar 10 in Tragic duet.
(retrieved from my drafts)

In the score, the Paetzold recorder is notated with traditional flat and sharp accidentals since I instructed the musicians to tune the instrument a quarter tone lower. Of course, this decision implies a negotiation with pitch notated in 12-note equal temperament which are also transposed a quarter tone lower (namely, $G^3 - C^\# - B^b - A$ in bar 10) (fig. 3.49).

10

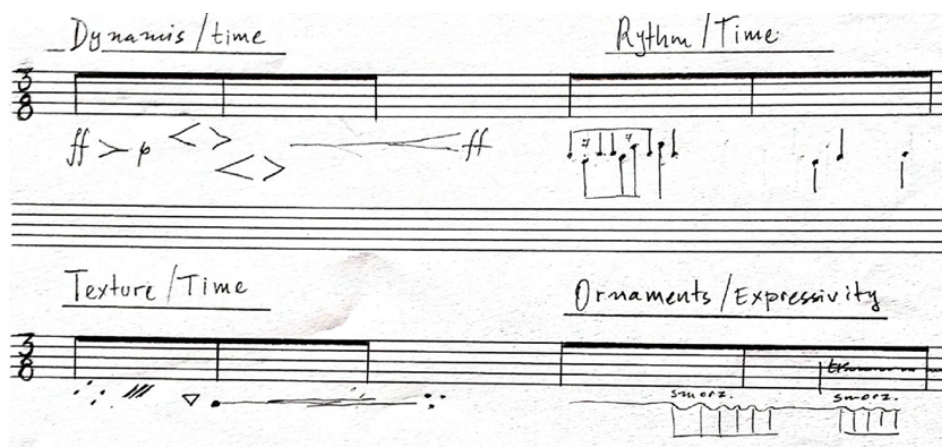
A tempo

Bass flute
Paetzold

Figure 3.49. Accidentals for Paetzold recorder are notated in a standard way.
The instrument is tuned $\frac{1}{4}$ tone lower.

<https://www.moralesossio-composer.com/example-b>

However, I believe that the most important contribution was effected in terms of how Karina and Paola shaped and internalised the new figure. Interestingly, rather than trying to integrate all the elements that articulate the reference figure (*f1*), the performers developed a more expressive approach by coordinating musical dimensions in time. This writing process can be analysed as a distribution of musical dimensions over the 3/8 bar (*fig. 3.50*): dynamics versus time, rhythm versus time, texture versus time and finally ornaments/expressivity versus time. This valuable material helped me configure various incoming figures.



*Figure 3.50. Distribution of musical dimensions in Tragic duet.
(retrieved from my drafts)*

The shaping process is principally an iteration of a recursive operation that updates a previous state of *f1* (bar 6). The result of this specific collaborative procedure had repercussions on the conception of, at least, the following four bars (the content of bar 10 interacts with *f1*, *f5*, *f7*, and *f2* for the composition of bars 11, 12, 13, 14, and 15). Again, the recursive dynamic refers to both a social–cognitive process and systemic action.

3.4.6 Interactions

Unlike the variety of interactive operations that I implemented in *Matters of fact*, in *Tragic duet* I used a sole method to carry out interactions between two pitch materials, as well as one specific operation for rhythmic transformations. These procedures, programmed in OpenMusic, are connected as follows (*fig. 3.51*):

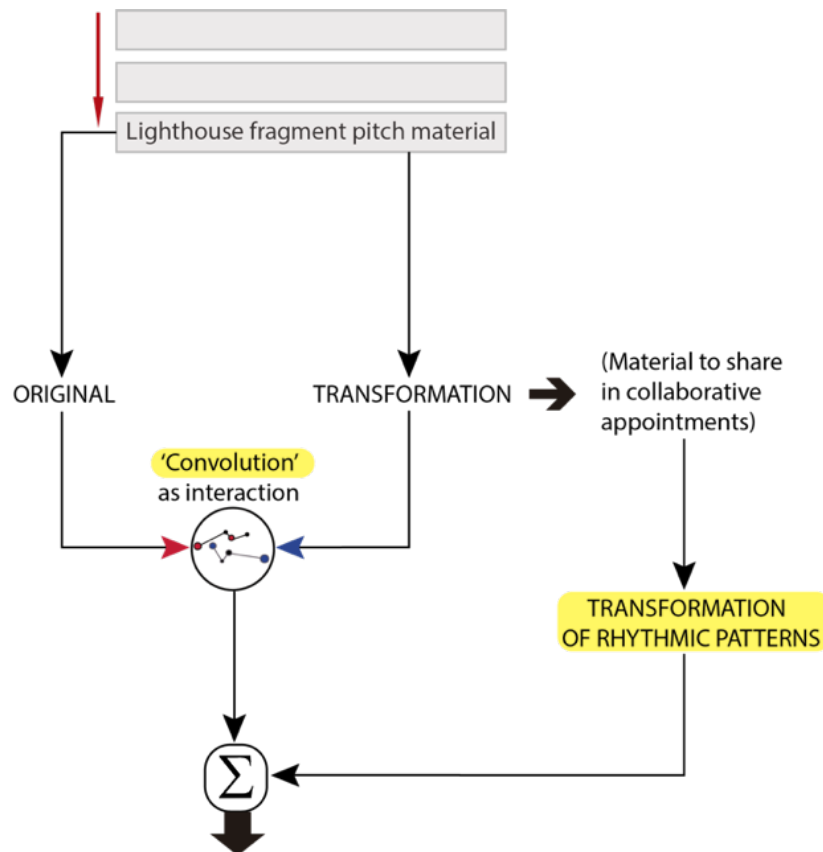


Figure 3.51. Interactive operations in *Tragic duet*.

Fragments enter one by one. Their pitch structures are transformed to provide material to be shared in different collaborative tasks and also to interact with their original versions. While interactions in the domain of pitch occur—through the operation called ‘Convolution’—the collaborative appointments produce delineated materials from which their rhythmic patterns are extracted and then transformed. Pitch and rhythmic outcomes are reassembled creating a new figure to fit into a bar. The next figure (*fig. 3.52*) shows the specific OpenMusic patch that implemented the creation of bar 11.

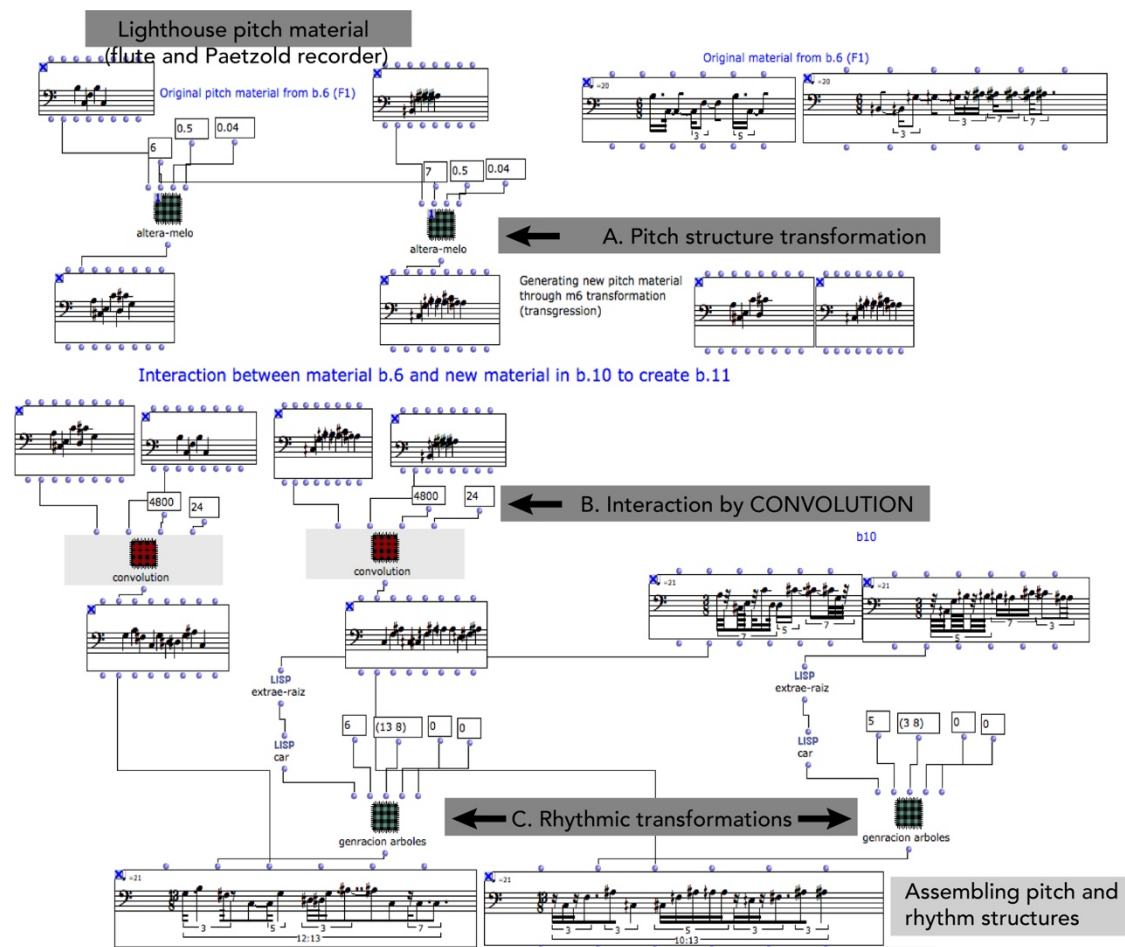


Figure 3.52. OpenMusic patch for bar 11 in Tragic duet.

A. Pitch structure transformation

This is simply an operation taking a pitch sequence and randomly changing some notes without altering the general shape (pitch trajectory).

B. Convolution

This operation is a personal adaptation of the homologous mathematical procedure. Convolution is the product of two functions that interact in a way that the shape of one is transformed by the other. In digital sound processing (DSP), for example, convolution acts in the domain of time, meaning that the components of a signal, specifically its amplitudes, are multiplied by the ones of

another signal through the method called overlap-add⁵⁷. Yet my implementation is a particular abstraction of this principle since I apply it in the pitch domain.

C. Rhythmic transformations

This procedure extracts the rhythmic structure of a musical material and reorganises its elements (sub-structures) into a new time measure.

3.4.7 Concluding remarks

I have already pointed out the differences between the deduced time grids in *Matters of fact* and *Tragic duet*. In both, the meaning of recursion is structurally different. In *Tragic duet*, recursion had two significant implications:

- A. More flexible interactions between materials (within limits established by the harmonic plan)
- B. A type of circulation of elements whose transformations were determined by an elementary operation: a permanent adjustment to the harmonic plan (long-term ascending gesture of the harmonic fields).

Thus, many gestures were born from the interaction between materials intended for the lowest instruments available and the collaborations performed by instruments with higher registers. They resulted not only from the specific operations embedded in each interaction, but also from the constraints imposed by the upward shape of the global harmonic display.

⁵⁷ see https://www.tutorialspoint.com/digital_signal_processing/dsp_discrete_fourier_transform_sectional_convolution.htm

Regarding the influence that these matters had on the creative participation of the performers in *Tragic duet*, I can conclude that:

1. The embodiment process of referential elements (lighthouses) and components emerging from creative collaboration occurred recursively both in the minds of the performers and in their musical instruments.
2. Instruments acted as devices that physically treated an abstract representation of form as a harmonic gesture. They were an active part of the transformative operations scheduled at the interaction points.
3. The internalisation and formation of new figures involved, in the case of Karina and Paola, a new approach in the composition process: they integrated novel expressive elements that were not necessarily foreseen. The multiple dimensions contained in those expressivities (rhythm, textures, ornaments) suggested the possibility of circularly linking them, as independent entities, to other interactive processes.
4. Tensions between the integration of novel elements by the performers and the generative restrictions which I formulated in the process resonates perfectly with the notions of fiction and 'escapism' (out of boundaries) that I wanted to permeate in the configuration of the figures that make up the piece.
5. With regards to the above, the Introduction was pretty much a literal transcription of my explorations with the instruments used. It represented the first source of referential components, both to configure identity frameworks and to represent 'escapism'.
6. The recursive processes positively impacted the decisions made by the performers, as they enhanced their creative potential within contexts that were rather restricted in structural considerations. This requires not only a vast knowledge of their instruments but also spontaneous openness and adaptability to collaborative environments where musical writing is the primary goal.

3.5 Examining ‘less-exhaustive’ cases

The following works are characterised by a more restricted collaborative approach in comparison to *Matters of fact* and *Tragic duet*. Geographical distance was a decisive factor, since the collaborative work I proposed to the performers was done in very limited time in Paris—*Tacto*—with Garth Knox; in Bremen—*Elogio de las cosas vacías*—with Benjamin Fischer (Ensemble New Babylon); and in Freiburg—*Viaje al cielo de Occidente*—with Teodoro Anzzelotti. However, though I knew that the expected creative processes would not be find the ideal closure, I decided to meet them at their workplaces for shorter collaborative sessions. The results gave an undeniable identity to the respective pieces I wrote. Under such conditions, recursion as a central preoccupation which I systematically developed in *Matters of fact* and *Tragic duet*, may appear here with a certain vagueness in relation to the ways that material circulate among agents. Indeed, the recursion approach in the three pieces presented in this section might be considered as a free and subjective understanding of the concept. Nevertheless, I will elaborate on the most important aspects of recursion in these three pieces. It seems to be more evident within performative dimensions than the actual creative collaboration as composition.

Another relevant element to consider in the analysis of these pieces concerns their extra-musical motivations. They take inspiration from three dissimilar topics: tactile multidimensional approach, philosophical reflections around the idea of emptiness and finally a political claim regarding the problem of extermination of some cultures by Western civilisations⁵⁸. Certainly, the whole compositional process, in tandem with the few collaborative sessions that I held, were structurally pervaded by these sources which became compositional principles accordingly.

In collaborative terms, my strategies consisted of providing both drafts/sketches and found-objects musical material to creatively develop collaboration in three ways mainly: (A) Sharing my own discoveries on playing/writing music with performers; (B) Listening

⁵⁸ Bowden (2019) has analysed numerous historical records to demonstrate that the idea of progress, and civilisation, in European-Western cultures “has come to be closely associated with conflict and conquest” (p. 73)

and analysing recorded material as gestural/figural references (lighthouses) for improvisations and embodiment processes; (C) Playing improvised versions of prototypical materials.

Although the three scores include improvised sections, it is only in *Viaje al cielo de Occidente* (*Journey to the western sky*) where I combine traditional notation with graphic means, whilst in *Tacto* and *Elogio de las cosas vacías* (*Eulogy of empty things*) I set rather unique moments in the scores for performers to improvise by considering 'accumulated' material which was indicated as cadenza moments. In this sense, these three pieces can be seen as a transition between a strict application of systemic approaches and the conception of pieces entirely based on collaborations leading to real-time shaping actions.

3.6 *Tacto*, for viola solo (2016/17)

Tacto was composed between October and December 2016. The sole version that exists was premiered by Garth Knox on 16th January 2017 at St Paul's Hall, Huddersfield/UK. During the process of composition, I had the opportunity to work collaboratively with Garth twice: on 6th October 2016 in Paris, and on 4th January 2017, in Aldeburgh.

In Spanish, *tocar un instrumento* means to play an instrument, but the verb *tocar* may also be translated as the action of touching, of course linked to the sense of touch (*tacto*, in Spanish). But, in a more abstract field, what may actually be understood by 'playing (touching) an instrument'? Which components do I 'touch' when I play a piece of music? Well, the tactility of fingers over the strings seems to be the most immediate and obvious component. The fact that the bow touches the strings with different pressure degrees might be taken as another kind of tactility. Furthermore, finger and bow tactility are continuously affecting one another describing a sort of choreography that articulates organised sounds and time.

The two collaborative meetings with Garth Knox focused on commenting and internalising the principal ideas of the piece. We particularly worked on how the notion of touch is embedded into harmonic, rhythmic, instrumental, and formal dimensions. For example, we explored the *scordatura*⁵⁹ (fig. 3.53) and how natural harmonics⁶⁰ behave in relation to my ideas about proximity and remoteness as different levels in the action of touching.

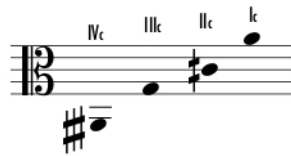


Figure 3.53. *Scordatura in Tacto*.

Particular implications of such experiments can be found in the third section of the piece (bars 43–84), where the presence of harmonics becomes progressively stronger. Figure 3.54 shows bar 55, which shows the greatest concentration of harmonics in the process. The melodic line tends to a certain symmetry with the note ‘A’ (see the highlighted notes below) acting as a pivot and reference point for distances.

Figure 3.54. *Tacto*, bar 55.

Rhythmical features have also been conceived through this foundational prism: regularity as opposed to the instability of the time flow. Also, there is the tactility of the form which is understood as a certain *relief*, similar to my compositional approach to quarter tones in the piece *Relief VI* (see Chapter 1). The dialogue with Garth around these concepts

⁵⁹ Watch the video at <https://www.youtube.com/watch?v=6r4mQGV0TRM&feature=youtu.be>

⁶⁰ Watch the video at <https://youtu.be/9gnclrObNqY>

certainly had a crucial impact on various qualities of the piece, particularly in the domain of form.

The form of this piece consists of a sequence of non-transitional states in which different 'fictions' about touch have been deployed. One of them relates to the conception of the harmonic material including the unusual *scordatura* I mentioned earlier. Its purpose is to facilitate the idea of proximity and remoteness of sounds in relation to reference points (sound)—open strings, for instance—and also particular occurrences of quarter tones.

With regard to the form, the piece has its origin in my own playing/improvisations on the viola. This tactile first experience with the instrument led me to write two long structures (called Improvisation 1 and 2 in the general structure) that became the first and the last parts of the piece (bars 12–33, and 195–236, respectively). Together with these two large sections, the piece is articulated by four shorter structures based on each string of the viola. It explores notions of surface and, at the same time, it describes a preliminary sense of physical touch over the strings:

1. Surface 1 (bars 1–11). Based on the first string (see the *scordatura* above), this introductory structure explores strident sonorities through delicate transitions between natural harmonics (D and E) and stopped notes (E).
2. Surface 2 (bars 34–42). Based on the fourth string, the structure can be seen as a drone partitioned by bowings that move across two positions (*molto sul pont.* and *poco sul pont.*) making three harmonics rise in relief.
3. Surface 3 (bars 155–172). Based on the second string, surface 3 represents a bouncing motion (*Sautillé sul tasto*) interrupted by a fast *tremolando* figure. The irregular intermittent motion also holds a process in which the fifth harmonic progressively takes more temporal place.
4. Surface 4 (bars 188–193). Based on the third string, this structure develops a moving (*tremolando alla punta*) surface with a recurrent melodic relief describing some sort of mode.

The general structure embraces ten sections, namely:

- I. **Surface 1 (bars 1–11)**
- II. [Improvisation 1](#) (bars 12–22) by me
 - a. First transformation (bars 23–27)
 - b. Second transformation (bars 28–31)
 - c. Third transformation (bars 32–33)
- III. **Surface 2 (bars 34–42)**
- IV. Multi-figural structure (bars 43–46)
 - a. First transformation (bars 47–49)
 - b. Second transformation (bars 50–52)
 - c. Third transformation (bars 53–55)
 - d. Further progressions (bars 56–84)
- V. *Arpeggios* (85–152)
- VI. *‘Algorithmic’ structure (‘153’–154)*
- VII. **Surface 3** (bars 155–172)
 - a. Transition (bars 173–187)
- VIII. **Surface 4** (bars 188–193)
- IX. *Cadenza Ad libitum. Agitato e furioso (‘bar 194’)*
- X. [Improvisation 2, finale](#) (bars 195–236) by me

The performance of the piece encompasses two specific moments in which the performer’s decisions and creativity are crucial. The main idea entrusts the performer with specific shaping operations. Firstly, between page 15 and 19 on the score, the musician’s decision has consequences on the outcome of the following bar. This section introduces a kind of ‘in the moment’ algorithm in which the performer simultaneously takes on the role of both a (‘random’) variable and the operator. The decisions adopted in every single stage of the process affect (and constrain) the ‘present’ decisions. This is actually one of the closest facets to recursion implemented in the piece. There are two types of elements articulating the section: 1. Three different types of fragments with nine ‘versions’ each (a to i); 2. nine melodic passages (*Insert 1 to Insert 9*). The system is a nine-

step process in which every decision determines whether the *Inserts* are headed by one or more fragments, or none at all. Garth Knox's version was as follows:

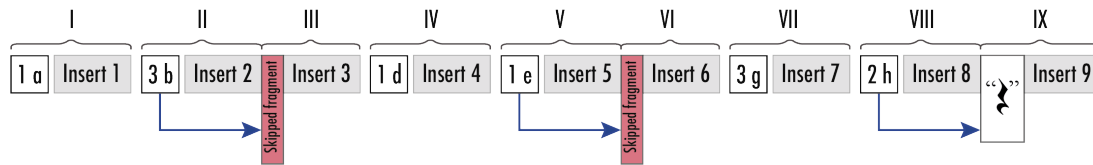


Figure 3.55. 'Algorithmic' structure. Garth Knox's choices in *Tacto*.

The other decision-making moment occurs in the section called *Cadenza. Agitato e furioso*. As in many of my pieces for solo instruments, my musical style is deeply marked by an '*aller-retour*' between a music that seems to be strictly controlled in terms of writing, and a music that appears more flexible regarding its construction, something certainly closer to improvisation. *Tacto* is no different from this idea; the piece begins and ends with passages entirely created through my own playing on the viola. Yet it is also shaped by different moments in which either the elasticity or flatness of elements seem to be in close-up. Such features (images, behaviours) led me to guide the form towards a moment of absolute flexibility⁶¹. In the *Cadenza* the performer must improvise for as long as he or she deems appropriate, following certain guidelines laid out by myself. The sketch below (*fig. 3.56*) represents the structure of the *Cadenza* with the sequence of elements engaged therein. There is a clear intention to progress from a heterogenic texture (many different elements embedded), through a continuous filtering process, into a calmer section defined by a more 'lyrical' character. Some graphic means support this suggestion. The main role of the *Cadenza*, as described in this sketch, was to create a dramatic connection to the final part of the piece, transitioning from a maximum density of elements in various dimensions (movement and position of the bow, variety of elements, variation, etc.) to a much more stable situation.

⁶¹ Even if I seek flexibility in terms of behaviour, I understand that, according to every performer or performance, the outcome of any improvisation (guided or free) might be seen as an accurately organised matter. Thus, at this point, the concept of flexibility should be understood through the performance optic, accepting that the result of the cadenza might not always be coherent with a perceived-flexibility.

CADENZA

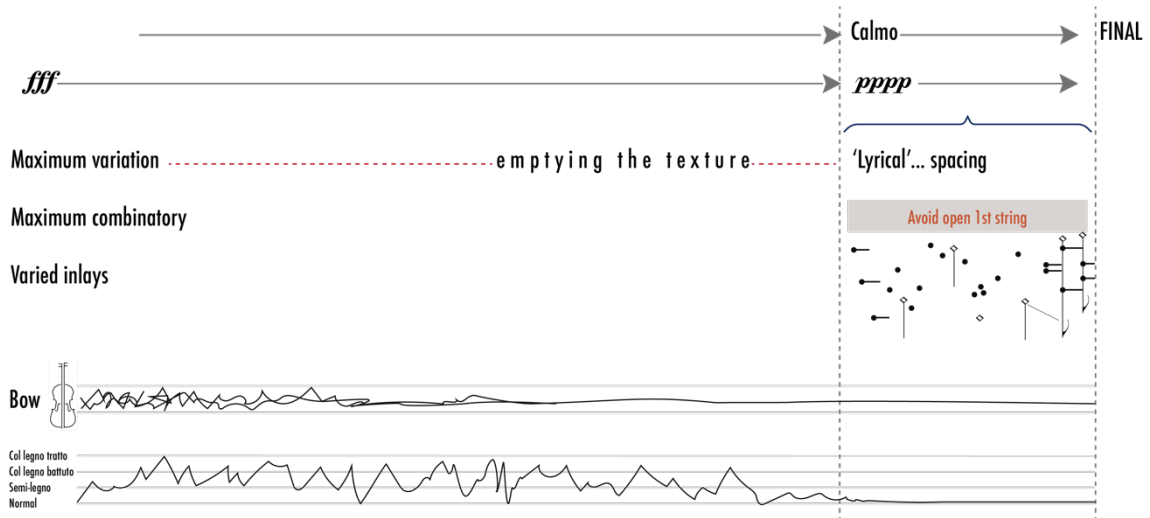


Figure 3.56. Sketch for the Cadenza in Tacto.

As I have mentioned, even though the piece does not present a strong approach to recursion as an extended compositional system, it includes valuable recursive methods of transformation intended to simulate collaborative works. Most of these methods were applied in the domain of expressivity by creating different configurations of dynamics, character, and timbre, for instance. The three transformations of my first improvisation (bars 12–33) give a clear example of this. I analysed the behaviour of my own explorations by considering several ‘expressive’ layers or, in other words, by observing the articulating components and how they relate to each other (*fig. 3.57*). In this operation, six interrelated parameters participate in my first improvisation (A0, in *fig. 3.57*): 1. the shape that pitched elements take; 2. their order in time (I assigned an index to each); 3. dynamic evolutions linked to the elements; 4. distribution of time (approximated rhythm); 5. character; 6. bow transitions between positions (timbre). The first transformation (A1) is given by an operation that randomly picks consecutive positions of elements and then makes a permutation of them (*fig. 3.58*).

Figure 3.58. Multilayer structure of Improvisation 1 (A0). Tacto.

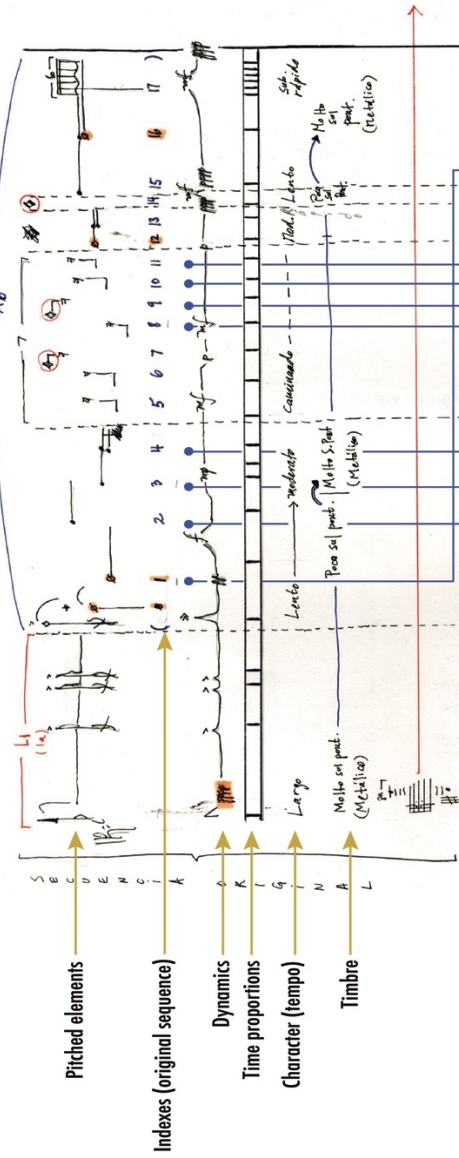
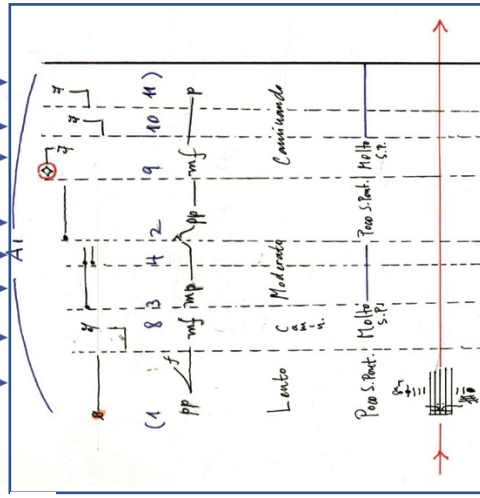


Figure 3.57. A1: First transformation. Tacto.



A1 takes the following elements from the original sequence of indexes:
(1 2 3 4 8 9 10 3)

Then, this sequence is randomly permuted, obtaining the following result in A1:
(1 8 3 4 2 9 10 11)

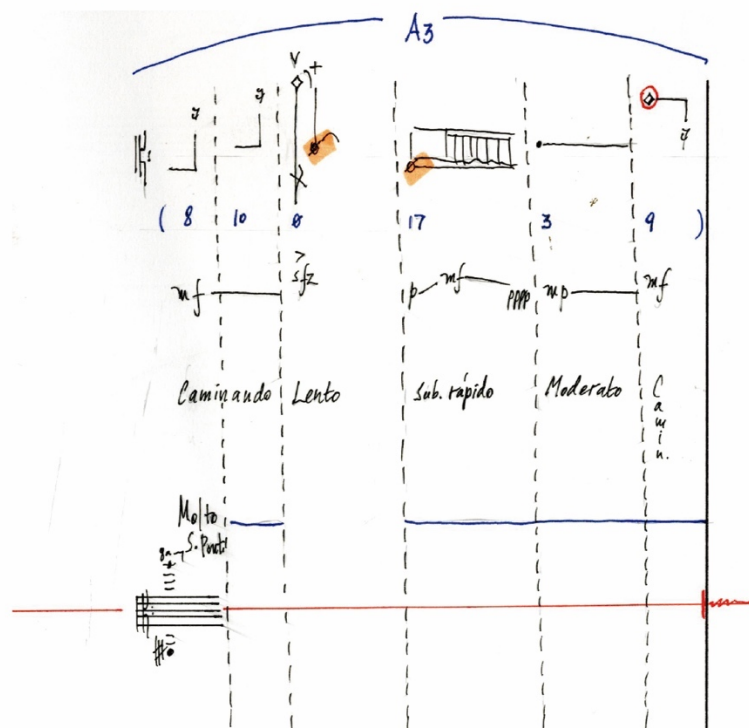
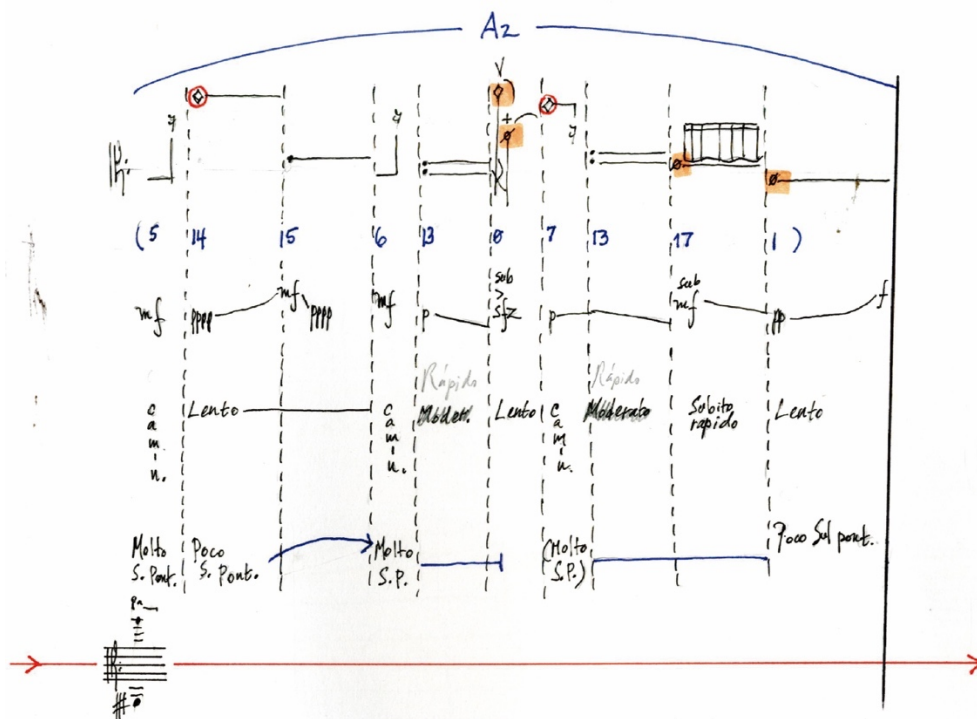


Figure 3.59. A2 and A3, two additional transformations. Tacto.

3.6.1 Concluding remarks

It is fair to say that spatial/temporal issues conditioned the collaborative work experienced in *Tacto*. My methods were adapted to the brevity of the meetings I managed to schedule with Garth Knox. Despite these issues, it is necessary to draw some conclusions that account for the modifications my methodology may undergo as far as time, space and the personality of the musicians is concerned:

1. The scope of my explorations on the viola had meaningful formal consequences: two of the sections are transcriptions of my own improvisations; furthermore, their materials are embedded in the development of other materials that would emerge later. The presence of these two long sections directly shows my personal approach to the idea of *tacto* and establishes the elements that define its multiple dimensions.
2. These dimensions were not only assimilated by Garth from the structural perspective they suggested. Undoubtedly, the sound identity of the piece is mostly linked to the natural way in which Garth adopted the concept of *tacto*. I am convinced that this was possible thanks to his high commitment to collaborative work and his particular approach to musical creation.
3. In the collaborative process of *Tacto*, limited by the factors mentioned above, the recursive principles that it had been developing underwent major methodological modifications. This fact led me to put a stronger emphasis on Garth's internalisation of the tactility, as well as on the way this concept should be incorporated into various layers of the work. I had to largely leave aside the systemic approach of previous works. Nonetheless, the idea of circularity and mutual affectation of the elements was maintained through the methods exposed in this chapter.
4. It was also crucial to restrict the number of tasks assigned to the Garth. In *Tacto*, the following actions were specified for our meetings held in Paris and Aldeburgh: internalisation, exploration with scordatura, and improvisation with given

materials. These were essential for Garth to understand the nature of my 'raw' materials, as well as for me to assimilate his particular way of approaching them.

5. Additionally, the collaborative tasks which I incorporated into the score (see sections VI and IX of the general structure) aimed to include two very different types of actions: selecting materials under certain constraints; and performing an improvisation (*cadenza*) with some guidelines. The first one had a role much closer to my systemic approach and tried to involve the interpreter with the writing process. This is equivalent to the actions carried out in *Matters of fact* and *Tragic duet* processes. The second task emerged as a kind of release of the energy embodied in the piece by Garth. To a certain extent, this semi-written improvisation gathers part of the experiences that we developed during the collaborations and the most characteristic elements of the work. In this sense, such a task also came to replace the actions of the transcribed improvisations as part of the recursive methodology applied rigorously in *Matters of Fact* and *Tragic Duet*.
6. Despite the time limitations, I am very grateful for the excellent availability and creative attitude shown by Garth who helped keep alive the musical expectations produced by the idea of collaborating.

3.7 *Elogio de las cosas vacías* (Eulogy of empty things) (2017), solo oboe, flute, percussion, piano, and cello.

But it is the empty things that are vast; things solid are most contracted, and lie in little room (Preface, *The Instauration magna* [The Great Instauration], 1620. Francis Bacon).

The piece was commissioned by Ensemble New Babylon and premiered on 26th September 2017 at Schwankhalle in Bremen, Germany. It was then presented in Buenos Aires/Argentina, Santiago and La Serena/Chile, and finally Hamburg and Leipzig/Germany between September and October 2017. It was written for five musicians: flute (also piccolo and bass flute); oboe; percussion (1 performer); piano (also MIDI keyboard); and cello. The presence of the oboe is particularly relevant not only because this instrument plays a soloist role, but also because it delineates notions of figure and leads transformation processes such as ‘emptying’, ‘fissuring’, ‘absorbing’, just to name a few.

It might be said that the music itself explores the idea of ‘interstice’ in the composition. This concept has multiple manifestations with different scopes and acts as a gesture of identity in the piece. Many dictionaries define the word ‘interstice’ as “a very small or narrow space between objects or surfaces”⁶² which has driven me to associate that concept with ‘silence’, ‘fissure’, ‘disappearance’, and finally ‘empty things’. The last one is understood as a metaphor of the immensity of empty things as spaces containing memory (resonance), or, from another perspective, as instants (interstices) where memory embraces or destroys the residual elements that cling to inertia.

Interesting sources of inspiration were found in Henry Moore’s sculptures. From my viewpoint, formal gestures of fullness and emptiness can be seen in Moore’s artworks (fig. 3.60). His apparent attitude of emptying body-like forms that flow in the space seems to remind us of our own interaction with the context. So that the observation of these forms updates our contemplation of the vastness of void and, at the same, it re-defines the value of solid forms. The paradox of empty/solid elements dynamically feeds organic

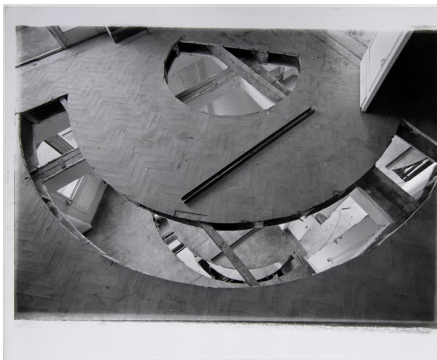
⁶² Definition obtained at <https://www.macmillandictionary.com/dictionary/british/interstice>

processes of mutual absorption between object and context. From the point of view of recursion, this particular artistic exploration strongly caught my attention.



*Figure 3.60. "Large two forms" (1966/69)
by Henry Moore (Yorkshire Sculpture Park). Personal picture.*

Another fascinating take on the problem of emptiness is that of the site-specific artworks of American artist Gordon Matta-Clark (1943–1978). As an architect, Matta-Clark explored remarkable actions of emptying and fissuring by carving enormous holes into ruined buildings.



*Figure 3.62. Gordon Matta-Clark, from the
series Office Baroque (1977).*

*Retrieved from
[http://obsessivecollectors.com/gordon-
matta-clark-at-macba](http://obsessivecollectors.com/gordon-matta-clark-at-macba)*



*Figure 3.61. Gordon Matta-Clark, Conical
Intercept (1975).*

*Retrieved from
[http://obsessivecollectors.com/gordon-
matta-clark-at-macba](http://obsessivecollectors.com/gordon-matta-clark-at-macba)*

This “anarchitecture” approach, to use Matta-Clark’s words, manipulates a reconfiguration of the idea of space through undoing actions that can reveal the intention

of perceiving the past and the present of things at the same time. In a more radical manifestation of the idea, Gordon Matta-Clark literally cut an abandoned house in two parts (*fig. 3.63*). Such an ‘anarchist’ operation causes a definitive fissure to the object. As a result, the house redefines its relationship with the vacuum, as well as adopting an additional sense of it, after its first emptying.



Figure 3.63. Gordon Matta-Clark, *Splitting* (1974).

Retrieved from

<http://obsessivecollectors.com/gordon-matta-clark-at-macba>

In a different area, Paul Virilio’s (1991) essay about disappearance (*The Aesthetics of Disappearance*) has been of particularly interest to me. In this book the French philosopher, cultural theorist, and urbanist introduces the key concept of *picnolepsy*, a momentary condition of our perception in which we miss consciousness. According to Virilio, *picnolepsy* might be an effect of speed as a main characteristic of the current life. Virilio provides a number of cinematic and photographic examples where *picnolepsy*-like (disappearance) phenomena occur (pp. 9–14). Velocity as a facet of motion, and disappearance as a consequence, are certainly two elements considered in the composition of *Elogio de las cosas vacías*. Indeed, as far as the form is concerned, there are two states (and transitions) that can be useful to explain an important feature of the piece: agitated motion that becomes surfaces/interstice.

In terms of form, the piece is divided into seven parts and a *Cadenza* after section six. Each part develops different approaches to the concepts mentioned upon through

different combinations of instruments and their roles. Though the oboe plays a conducting role in every structure, I believe that both percussion and flute pervade the whole piece with fissuring elements. While the percussion set tends to maintain the initial rhythmic energy with fast figures, the flute picks up the most relevant accents 'left along the road' by the oboe, thus emphasizing the ubiquitous character of the soloist's line. But, at the same time, the flute inlays a memory into the general texture like a cord that twists its shape through different register changes (flute, piccolo, flute, bass flute). Fig. 3.64 illustrates the kind of texture I tried to create.

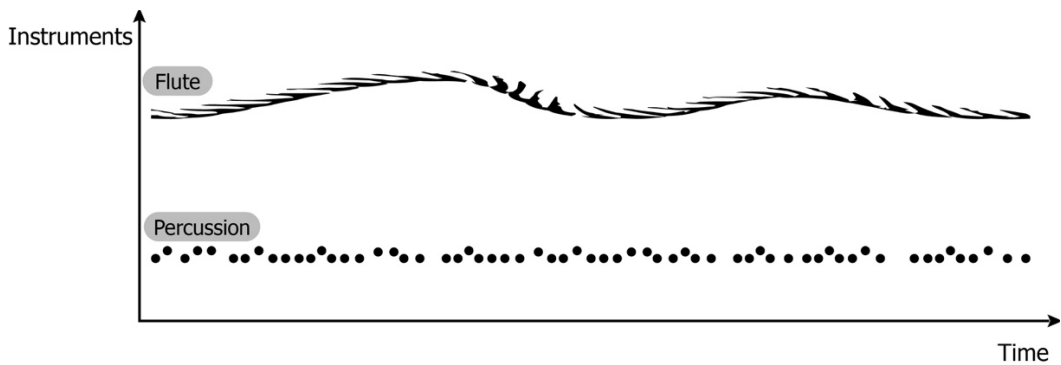


Figure 3.64. Fissuring shapes in *Elogio de las cosas vacías*.

The table below outlines the formal structure of the piece:

Section	Features	Bars	Duration
A	Oboe/tutti. 1 st emptying process	1–25	1' 35"
B	Solid state of the ensemble, but detached cello playing fissuring gestures (<i>gliss.</i>) Irruptive stops as a vertical fissure (i.e. Matta-Clark's Splitting).	26–36	2' 12"
C	Developing coupled roles of instruments: <ul style="list-style-type: none"> - Oboe/cello (multiphonics) - Oboe/piccolo (surface colours) - Piano (fissure) - Percussion (accents + fissure) At bar 42 the solidness (house) is somehow left First improvisation of oboe	37–62	1' 59"
D	Mosaic 1: new solid texture and fissuring interventions of the percussion. Then, the rest of instruments empty the texture. The music recovers its <i>figural</i> feature	63–69	0' 56"

E	Mosaic 2: second solid texture. Oboe, flute, percussion, and cello against fissuring gesture by the piano (descending clusters with ornaments) <i>Libero e delirante. Quasi una cadenza.</i> Duo oboe + piano. Free character.	70–77	1' 13"
F	<i>Molto flessibile.</i>	78–82	1' 11"
Cadenza	Tranquillity, melodic fragments and use of multiphonics as tensional elements by the end of the section.	83	0' 36"
G finale	Oboe, flute, percussion, and cello. First part fragments return within a contemplative context partitioned by some stops (vertical fissure) marked by percussion.	84–108	1' 51"

Figure 3.65. Elogio de las cosas vacías. Structure.

Section A frames an interesting emptying process of the line played by the soloist. The piano progressively absorbs the set of pitches presented in the first bar by the oboe, it creates a silence when a pitch reaches its second or third repetition. While the oboe line loses its particles and rapidly goes into the void, the flute and cello accompany it and keep its original energy alive. Emptying and absorbing can be considered as a recursive aspect of the compositional system. The pitch material carried out by the oboe (see the 4 sequences placed over the score in *fig. 3.66*) is shared with the piano in a circular process where this latter instrument absorbs the notes that have already appeared from the first sequence: While the soloist attains emptiness, the piano seems to reach an increasing activity and density (see the whole process between bars 1 and 5).

Figure 3.66. First emptying process in *Elogio de las cosas vacías*.

A

The musical score is written for six instruments: Oboe, Flute, Percussion, MIDI keyboard, Piano, and Cello. The score is divided into two systems. The first system (measures 1-10) shows the Oboe and Flute playing a complex rhythmic pattern with dynamic markings of *ff*, *p*, *mf*, and *ff*. The Percussion part has a steady rhythm with dynamic markings of *f* and *pp*. The MIDI keyboard and Piano parts are marked *mf* and *p*. The Cello part has a steady rhythm with dynamic markings of *f* and *pp*. The second system (measures 11-20) shows the Oboe and Flute playing a complex rhythmic pattern with dynamic markings of *ff*, *p*, *mf*, and *ff*. The Percussion part has a steady rhythm with dynamic markings of *f* and *pp*. The MIDI keyboard and Piano parts are marked *mf* and *p*. The Cello part has a steady rhythm with dynamic markings of *f* and *pp*. The score includes various articulation marks such as accents, staccato, and slurs. The tempo is marked *And* (Andante).

In tandem with the specific procedure described above there are three more considerations about methods and qualities of emptiness and fissure in the piece, namely:

1. Multiphonics are intended as a 'damaged' space. They absorb different pitch materials. The multiphonics themselves act as a resonant space for memory.
2. Organisational domain. The organisation and gestural distribution represent themselves as an act of cracking the formal space. This operation allows the placement of 'emblematic' figures acting as reference points (lighthouses) in the process of emptying and absorbing.

Sound manipulation. The idea of fissure has been also developed through specific instrumental procedures in the spectral domain. For example, the sound below (*fig. 3.67*) has been obtained over the basis of a multiphonic 'filtered' by shifting the position of the reed onto the lips. The evolution of this action creates a kind of fissure within the spectrum. While the coloured image shows a spectral representation (frequencies / time / intensities [coloured]) the grey one shows the corresponding waveform.

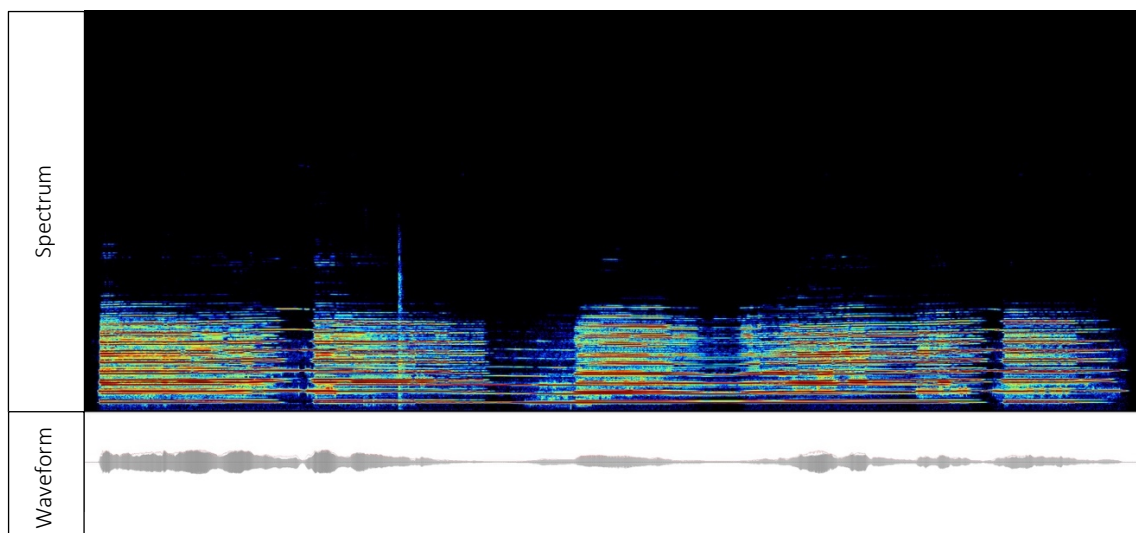


Figure 3.67. Spectral representation.

This is one of the various multiphonics used in Elogio de las cosas vacías: this behaves as an element that fissures the spectrum.

<https://www.moralesossio-composer.com/elogio-de-las-cosas-vacias-multipho>

The collaborative work took place with German oboist and artistic director of Ensemble New Babylon, Benjamin Fischer. This was held in Bremen at Benjamin's home on the 28th, 29th, and 30th September 2017. Our meetings consisted first of recording a list of different techniques, including a wide range of multiphonics. However, after having recorded 'technical' materials, we worked on the assimilation of the main material (see 'figures') of the piece. In order to do this, I prepared several improvisations with specific instructions, aiming towards a definitive notated version. For example, Benjamin improvised on a list of multiphonics, with the following audio example being particularly representative: <https://www.moralesossio-composer.com/elocio-de-las-cosas-vacias-mult-2>. I integrated it at the end of section F to create a brief bridge between the atmospheric sonorities of this section and the *Cadenza* (see bar 82 in the score). The improvisations performed around the most important figure of the piece (*fig. 3.68*) illustrate another important contribution given by these methods.

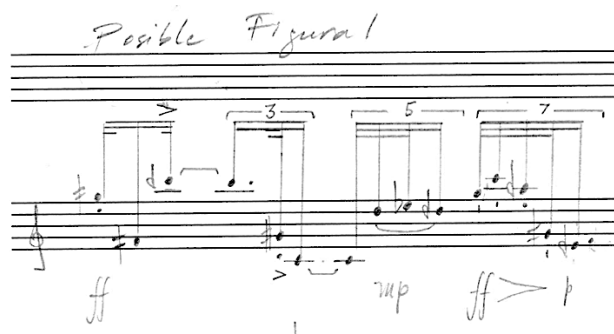


Figure 3.68. Seminal figure in *Elogio de las cosas vacías*.

3.7.1 Concluding remarks

The concept of interstice was explored from my imagination and also throughout the first collaborative sessions with Benjamin Fischer. As in many of my works, I tried to accomplish the main idea in multiple dimensions and with different levels of depth.

In *Elogio de las cosas vacías*, the act of splitting a surface (or emptying, in a more poetic sense, following the epigraph of Francis Bacon) had more significant repercussions on the

instrumentality proposed in the piece. The formal intention consolidated into the creation of a solid sound-mass that 'twists' itself, creating, under this act, truly instrumental voids. The latter articulated a dynamic of presence/absence that is outlined in the aesthetics of disappearance developed by Virilio. This formal dynamism reflects into an internal organicity of instrumental relationships and as a total absence crisis (*picnolepsy*), which leads to a sudden loss of reference. Therefore, although the sonic 'contortion' that I proposed has a long-term profile (that is delineated continuously by the oboe as the soloist of the ensemble) this material has its own internal emptying processes, which creates different interstitials micro-qualities.

It is fair to point out that the composition of *Elogio de las cosas vacías* implied a higher concentration in the personal workspace, since, as in *Tacto* and in *Viaje al Cielo de Occidente*, spaces for collaboration were scarce. The writing of the work, however, showed me the possibility of designing a process where the results were the product of interactions between a fixed material and a rather imaginary collaborative one. In this search, the three days of collaboration with Benjamin Fischer in Bremen were essential to understand how my ideas materialised effectively. This work was influential in three aspects:

1. The internalisation of the interstitial elements that I presented to Benjamin, namely, multiphonics of fragile emission, microtonal divisions, and the seminal figure of the piece. In tandem with this, the appropriation of these factors would be crucial for the performance of freer passages (improvisation and Cadenza, for instance) where he would deploy spontaneously the musical ideas that I proposed to him.
2. The development of speculative approaches to Benjamin's (possible) contributions in my workspace, since there would be no more collaborations after the ones held in Bremen. Here, recording and classifying collaborative materials was essential to (re)build a sequence of contributions that I could follow later in the compositional process.
3. Once embodied, Benjamin would share instrumentally and verbally with his ensemble partners the ideas that articulated the piece.

3.8 *Viaje al cielo de Occidente* (Journey to the western sky) (2017/18), for accordion and electronics.

The piece was composed between November 2017 and January 2018 and is dedicated to Teodoro Anzellotti who premiered it on 15th February 2018 at St Paul's Hall in Huddersfield. I completed a considerable part of the compositional process thanks to his collaboration during three sessions at his home, in Freiburg, Germany, between 15th and 17th December 2017.

The piece is a tribute to Lola Kiepja (–1966) who was considered the last member of the Selk'nam community.



Figure 3.69. Lola Kiepja.

Picture retrieved from <https://www.selkn.cl/blogs/huellas-hombres-de-pie/lola-kiepja-una-mujer-imposible>

Selk'nam, or Ona, was a culture that lived in Patagonia, in southern Chile and Argentina. They were systematically exterminated since about 1880, when European people began the occupation of the Isla Grande, in Tierra del Fuego. Lola possessed a deep knowledge of mysticism and mythology of her people, being herself *xo'on*, that is, a shaman.

Together with Lola, all direct testimony of this Paleolithic culture disappeared (Chapman & Taller Experimental Cuerpos Pintados, 2002, p. 21). What has been particularly inspiring and moving in the composition of my *Viaje al cielo de Occidente* is the great power and presence of the voice in the Selk'nam culture. They did not build musical instruments but, in their use of the voice, some percussive elements and accompaniment features can be noticed through the use of recurrent phonemes. Thanks to Lola's knowledge of some Spanish, some of her song lyrics have been translated.

According to French-American ethnologist Anne Chapman (2002), the Selk'nam divided their territory into *haruwen*, that is, land's units inhabited by patrilineal or patrilocal families (p. 100). Each group was connected to one cardinal point called *shó'on*, or sky. Indeed, one of my first approaches to the composition of this piece was through the contemplation of two of Kiepja's shamanic singings⁶³, in which she narrated her own posthumous 'journey to the western sky'—where her mother and her ancestors belong.

It could be said that the piece follows the form of one of these two shamanic singings (number eight and three in the Chapman's catalogue) in which singing, vocalisations and vocal rhythmic sequences alternate. The next illustration shows the waveform of singing eight (fig. 3.70). The grey marks highlight six singing sections acting as interpolations between six recitations with complex rhythmic patterns.

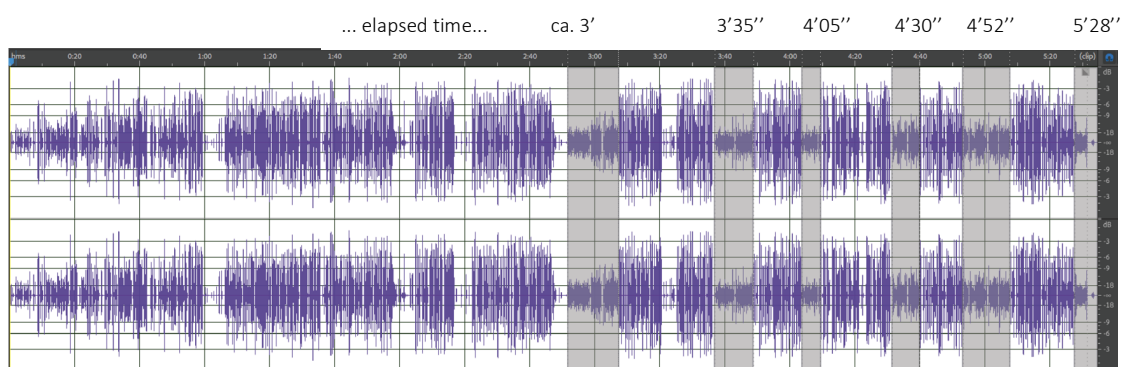
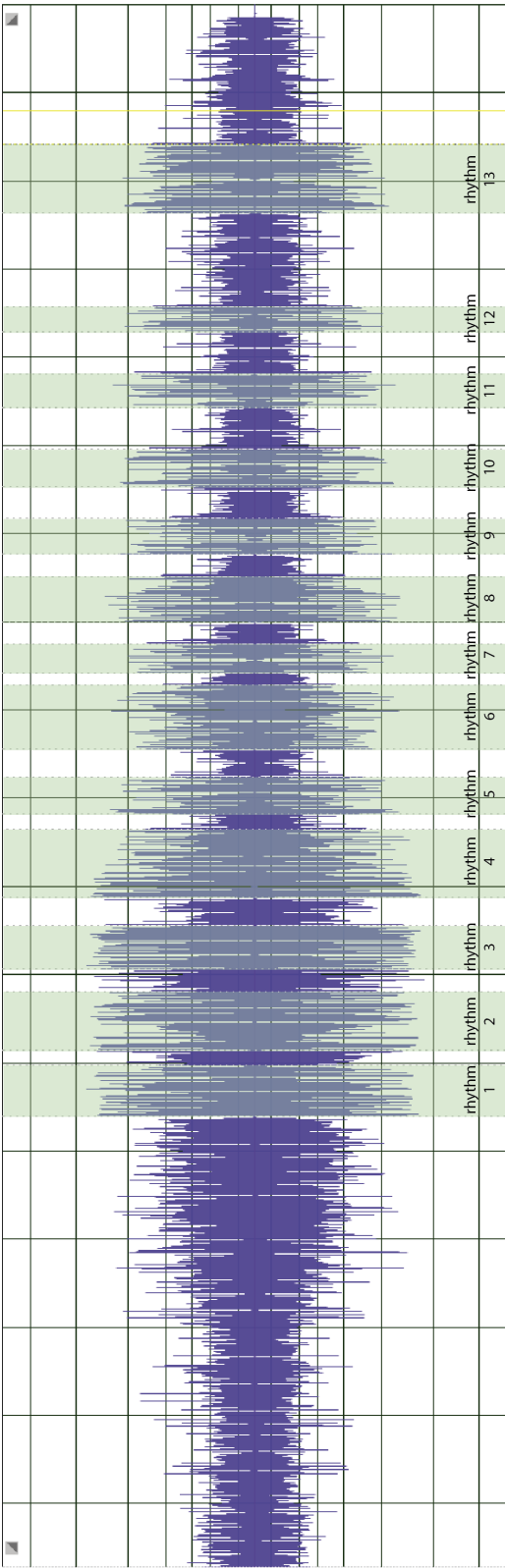


Figure 3.70. Shamanic singing eight (from Anna Chapman's book).
Waveform and marks for six singing sections <https://www.youtube.com/watch?v=6pCvBrbBMjc>

⁶³ Anne Chapman recorded more than 80 songs performed by Lola Kiepja. This catalogue can be heard at https://www.youtube.com/watch?v=JjuE4LEsolE&list=RDJjuE4LEsolE&start_radio=1&t=0

Interestingly, the structure for singing three (fig. 3.71) presents an inverted sequence: thirteen rhythmic recitations acting as interpolations between singing fragments (see the transcriptions in fig. 3.72).

Figure 3.71. Shamanic singing three (from Anne Chapman's book).
Waveform and marks: the highlighted zones correspond to the thirteen rhythmic sections.



(♩ = c. 120)

Rhythm 1

Rhythm 2

Rhythm 3

Rhythm 4

Rhythm 5

Rhythm 6

Rhythm 7

Rhythm 8

Rhythm 9

Rhythm 10

Rhythm 11

Rhythm 12

Rhythm 13

The figure displays thirteen rhythmic sections, each on a musical staff. The tempo is marked as (♩ = c. 120). The sections are labeled Rhythm 1 through Rhythm 13. Each staff contains a sequence of notes and rests, with some notes having fingerings (e.g., 5, 7, 3, 6) written above them. The notation is in a simplified form, likely representing a specific musical notation system used in the source material.

Figure 3.72. Transcription of the thirteen rhythmic sections.
From Kiepja's shamanic singing three
(my transcriptions).

3.8.1 Form and material (subjective transcriptions)

This structural alternation contains however, from my point of view, an interesting dynamic given by tensions between strongly articulated recitations and 'tender' melodic lines (though melodic sections in singing three shows clear rhythmic patterns). *Viaje al cielo de Occidente* does not only follow the alternation dynamic of song eight as a form; it is specifically based on such tensions. From the formal and microstructural perspectives, I devised two major operations. The first one aims to avoid a textually made representation of Selk'nam singing language, whereas the second one was designed to directly extract quotes from the recordings.

As *figure 3.70* shows (waveform and marks for six singing sections), singing eight alternates twelve sections. Similarly, *Viaje al cielo de Occidente* takes the same structure including durations of every section (approximated in the performance). The first part, for instance, is an about three-minute-long introduction in which air sounds and rhythms occupy the first 'foreground'. The remainder of the sections alternates semi-improvised and strictly notated fragments. The content of each section is mediated and rhythmically articulated by both materials extracted from Lola's songs and collaborations made with Teodoro. Nevertheless, I have added two more sections at the end of the piece. Section thirteen includes a short 'bridge' that guides the performer into a free improvisation with electronics; finally, the CODA introduces a relatively new gesture of fourteen growing clusters which are accompanied by air-like electronic sounds.

From the micro-organisational viewpoint, my procedures started by analysing phonemes from both recitations and sung passages. The formers are actually the most relevant materials in terms of the energy and identity that they bring to the piece. These rhythmic recitations became the engines of the piece, and the phonetic articulations add a crucial dimension to these passages. My first task was therefore to grasp the 'microscopic' universe behind this complex language. Because of the lack of people who speak the Selk'nam language, just a few studies have investigated its phonetics. However, in my work, there was no intention to develop a phonetic approach; I focused more specifically on the articulation of phonemes and, on the way, they behave over time (their

envelopes). In order to do so, I brought these microsounds into the phonetics of my mother tongue (Spanish) and approximated the rhythms to facilitate the understanding of the articulation shapes. As an example, I took an excerpt from song 8, called it *Cantando 1* (Singing one) and divided it into three parts (sentences?) (<https://www.moralesossio-composer.com/viaje-al-cielo-de-occidente-cantos>). The following manuscripts (figures 3.73–3.75) show my transcriptions.

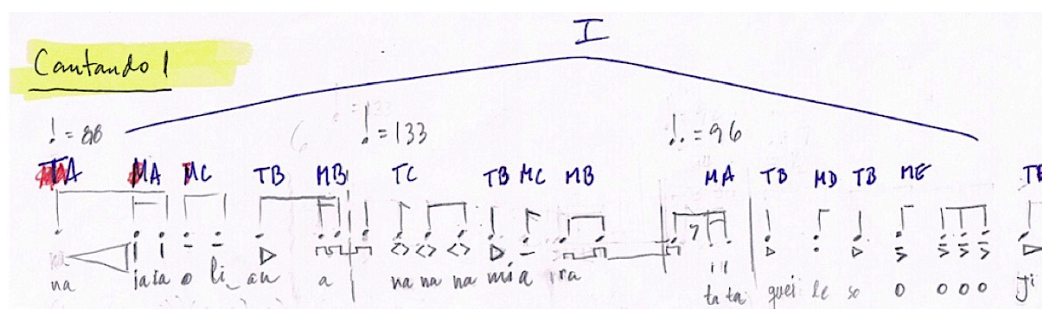


Figure 3.73. 'Cantando 1' first part. Viaje al cielo de Occidente (retrieved from my drafts).

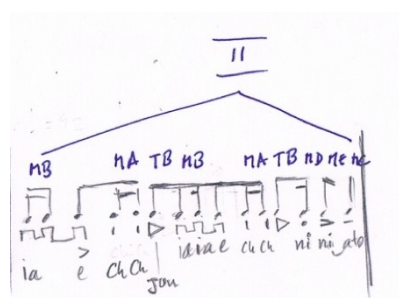


Figure 3.74. 'Cantando 1' second part. Viaje al cielo de Occidente (retrieved from my drafts).

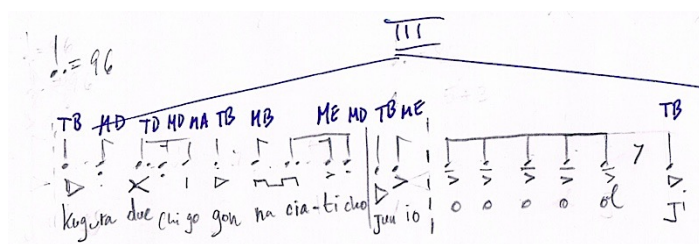


Figure 3.75. 'Cantando 1' second part. Viaje al cielo de Occidente (retrieved from my drafts).

I wrote different categories of articulations over those rhythms: 'M' means marked (strongly accentuated phonemes), whilst 'T' stands for transitional. There are five sub-categories for 'M' (A to E) and four for 'T' (A to D), which I have notated as follows (fig. 3.76):

Articulaciones

sonido nasal
nasal sound

sonido N

59

(n → a) } TA

mf

(solo aire) } MA

mf

NASAL - NORMAL

sub. ?

gliss

Registros: Medio y grave

Registers: Medium and low

LH RH } Probar

(ataque "a" — "n" (resonancia))
(attack "a" — "n" [resonance])

"ia"

smorz.

"e"

MB

TC

"a"

MC

MD

TD

Como MC pero con acento al principio
(Marcato, con valores cortos e iguales) } ME

This is like MC but with an accent added at the beginning (Marcato, with shorts and equal durations)

Figure 3.76. Types of articulations in *Viaje al Cielo de Occidente* (retrieved from my drafts).

These particular notations were very useful in my collaborative sessions with Teodoro. As part of an embodiment process, the first step was to translate these particles into the

accordion language (listen to this at <https://www.moralesossio-composer.com/viaje-al-cielo-de-occidente-cantos>). In a second stage, this material led me to create a ‘pool’ of minuscule elements for improvisations. As can be observed in my previous pieces, when it comes to collaborative work my main intention is to capture the creative ways in which performers deal with fragmented (raw) materials through guided improvisations. In the three collaborative sessions with Teodoro I proposed to improvise by considering both the recorded material to which Teodoro needed to listen and the ensemble of articulations which he instrumentally deduced himself. One of these improvisations resulted in a recurrent structure in the piece (see bar 45, for instance). You can watch the video of Teodoro’s improvisation at <https://youtu.be/oMP3WEIbEJk>.

The composition of different passages in the piece was achieved through a constructive principle based on the three articulation structures present in *Cantando 1*. Once I had the specific articulation shapes that Teodoro conceived for the accordion, I elaborated new sequences to compose a kind of translation for the instrument. In the example below (fig. 3.77), I took selected elements from the three parts of *Cantando 1* to obtain a derived structure which determined the sequence of fragments in bar 60. The resulting sequence is now organised in rhythmic terms: a macro rhythm organises the duration of each articulation (figures 3.78 and 3.79).

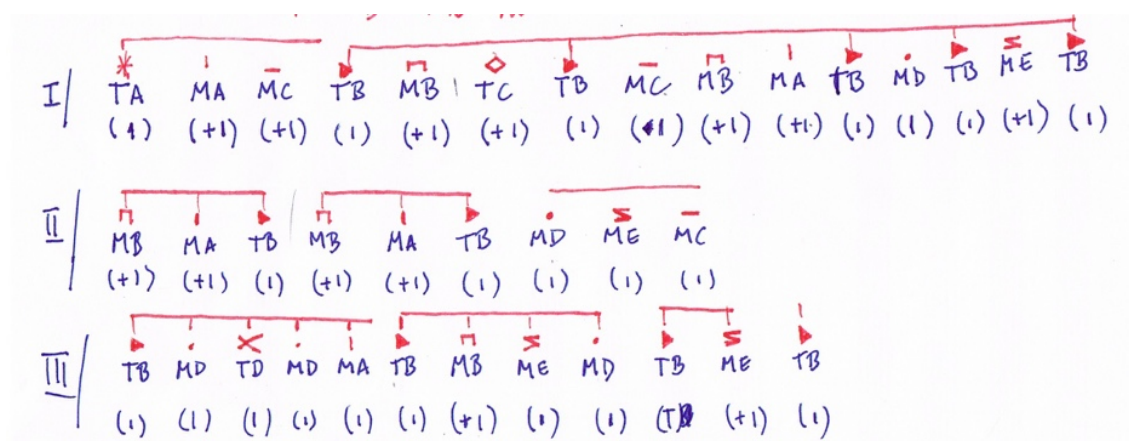


Figure 3.77. Articulative elements in *Cantando 1* (retrieved from my drafts).

By putting selected elements into a certain order, one obtains the following:

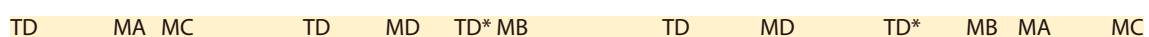


Figure 3.78. Reordering articulative elements.

This in turn organises the sequence of shapes in bar 60 (fig. 3.79). Song 8 provides rhythmic values to the sequence.

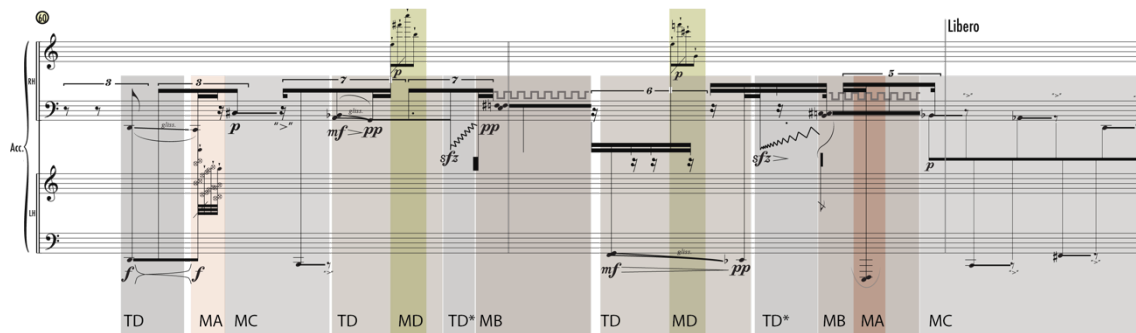


Figure 3.79. *Viaje al Cielo de Occidente*, bars 60–62.

Similar to what some linguistic studies have suggested, recursion acts in shaping processes to create different syntaxes. The structural operation is guided by a recursive perspective. The way in which elements appear one after another might be analysed through recursive statistical methods such as the first order Markov matrices. TD, for example, appears 5 times, representing the 38% probability of occurrence in a sequence of 13 elements. Furthermore, every repetition is varied in, at least, duration and pitch. This might suggest there is an operative mechanism that determines transformations, which is an important quality in recursive systems. It can be noticed that already in the second part of *Cantando 1* the pattern MB MA TB is repeated, but at the same time it was somehow announced in the first part and then permuted in the third part (see fig. 3.80).

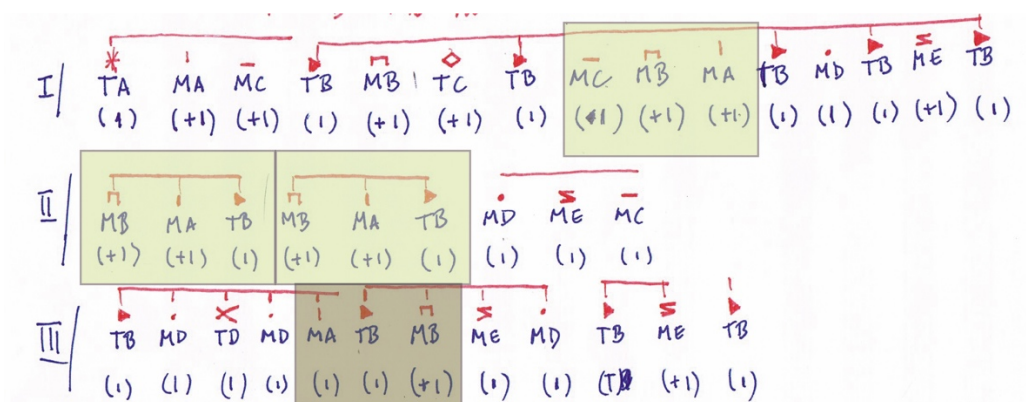


Figure 3.80. Presence of recurrent combinations of articulations in *Viaje al cielo de Occidente* (retrieved from my drafts).

This specific technique, which I used to reorder elements referring to a model structure, is a deliberate recursive action to produce self-reference situations in local constructions. But this principle has also been applied as a formal generative operation given by the nature of Lola’s song eight and three. As the following figure shows, the formal plan may be seen as a sequence of structures that refer to each other creating continuous updates of the origin. The figure indicates the bar numbers and duration of structures.

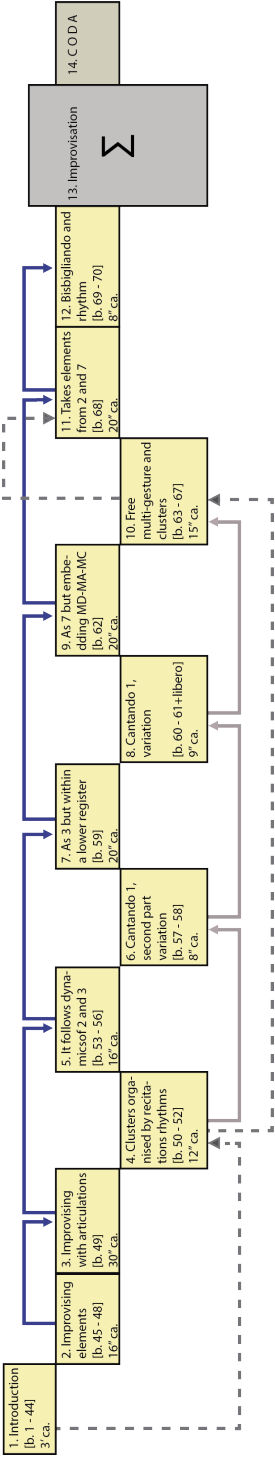


Figure 3.81. Viaje al Cielo de Occidente; structure.

Regarding citations, they play two roles which are carried out in the electronic part. On one hand, there are explicitly cited materials which are fragments of recitations and singings. Most of them are treated electronically so that, at the very beginning, the sound is very direct and dry. It is subsequently treated with some reverberation; this simulates a swift transition towards a different space. One of these explicit citations occurs at the very beginning of the piece. On the other hand, we encounter some kind of quotation referring to an implicit presence of samples, since they are only used to interact with a *ring modulation* module. The result is typically a shape transfer, similar to electronic concepts used by Stockhausen in *Hymnen*⁶⁴ (1966/67) and *Telemusik*⁶⁵ (1966): in the end, merely the rhythmic profile of the fragments remains. The patch operating this effect takes samples and multiplies their signals by an oscillator bank providing diverse harmonic qualities. This interaction shapes a new sound which combines spectra and rhythm of both signals, an electronic technique that Karlheinz Stockhausen called ‘intermodulation’ in the afore-mentioned works.

The main role of electronics has three facets:

1. To extend and enhance the electronic dimension containing the notated version of the instrumental part (accordion)
2. To support explicit and implicit citations (voices by Lola Kiepja)
3. To complement the harmonic universe of the instrumental part

The stereo electronic part was entirely programmed in Max/MSP 7 and consists of six interconnected modules:

1. Samples to trigger
2. Ring modulator
3. Mixing accordion natural sound and synthesis sound
4. A stutter processor
5. Doppler effect
6. Spectral delay

⁶⁴ (Stockhausen, 1968, 1995a)

⁶⁵ (Stockhausen, 1969, 1995b)

3.8.2 Found materials and embodiment; conclusions.

The collaborative strategy of presenting a material that I found to Teodoro was a suitable way to induce the embodiment of the identity elements in his interpretation. As I already commented, the first step in the collaborative process was teaching and showing the origin of the materials (sung/recitation expressivities by Lola) to Teodoro. These materials, once again, acted as essential references which were assumed in my work on three levels:

- a. As elements transcribed, transformed and written down in the score (conventional notation)
- b. As input for improvisational spaces
- c. As electronic elements

These three levels mutually interact according to a dynamic idea of form whose adaptability depends on the performer's engagement with a creative attitude and organically assimilated materials. It is worth noting Teodoro's open attitude in order to understand that much of the work's gestation depended on our collaboration in this process of assimilation.

4 Circularity embodied in the core of shaping dynamics

4.1 Overview

In Chapter 3, I analysed how recursion is embedded at the centre of an extended method of composition, appearing not only as a generative quality within algorithms, but also as a central catalyser within creative micro-social ecologies which also involve the technology.

As I have explained, it is my own background as a musician that led me to explore other practices of composition. From my beginnings, alongside my composing, I have practised popular music, free-improvisation, and performed electroacoustic music. However, I have only recently considered the possibility of working on musical ideas involving a kind of ‘need of agreement’ in shaping less-specified outcomes. Indeed, such a need involves performance actions and decisions to realise music that meanders the boundaries of the written and improvised. Consequently, the supposed agreement is intended as a performance challenge; to carry out both the written indications and autonomous decision-making required in improvisational moments.

Without entirely leaving behind the generative principles of the pieces presented in Chapter 3, the group of pieces that I examine in this chapter integrate recursion as both a function of the music and of the sounding process. Both approaches have an impact on the notations that I have developed and on how performers relate to the notation, what decisions they make concerning instructions notated in the score, and how they deal with creative collaboration. Since I did not use computational means to shape the music, rather to establish basic material such as pitch structures and temporal proportions, the role of the formalisation of musical processes appears less important. However, the role of communication in collaborative work has been essential in the realisation of these pieces, as it involves another dimension of recursion: natural feedback between people

as the basis of social creativity, in which the music evokes the pedagogical element of oral tradition.

4.2 Creative collaboration perspective

In the previous chapter, I analysed how the principle of recursion was incorporated into my compositions by implementing specific strategies that involved both creative engagement and reflection from the interpreter when dealing with the materials. It could be generally observed that some characteristics of a sociocognitive approach might frame these actions. As Glăveanu (2011) showed, this perspective is based on an epistemological position that considers the relationship between the social/individual as two separate units that create interdependence without losing their own qualities. Cognitive psychology, for example, visualises a person as a unit that processes information from the environment, just as the environment provides the variables conditioning the individual: “Creativity as a phenomenon is therefore embedded primarily at an individual level and, furthermore, localised within individual cognitive processes” (p. 4). Glăveanu (2011) also emphasises that the creative processes developed by groups can be described as interactions “[...] of distinct “units” (persons) and their mental functioning, [...]”, and these interactions provide “[...] the “inputs” and takes over the “outputs” of each individual, allowing the creative process to continue” (p. 4). This viewpoint could theoretically frame a large part of the operations carried out in the first group in my portfolio. Nevertheless, it is also true that such an understanding links to collaboration as a means of exchange and construction of knowledge, the analytical conversation between participants, and the social element as an inherent part of creativity. These qualities were identified by Glăveanu within a sociocultural framework (p. 3). One of the dimensions that most differentiates the practices carried out in both groups of my portfolio is the methodology. While in works such as *Matters of fact* the tasks suggested to the interpreters were rather precise and did not extend over time, in this chapter I will show that the collaborations focused on the sound qualities of the results, in collaborative spaces that were particularly expanded over time.

It is well-known that the aforementioned sociocultural position has relied on creative collaboration. Although recent research about this topic has been done, this remains in a marginal place in comparison with the research developed on sociocognitive epistemology (Glăveanu, 2011, p. 9). One of the most important contributions in the sociocultural area has been made by Professor Vera John-Steiner (2000), who extensively investigated the multiple facets of creative collaboration. Her approach shows that creativity is not only born from an individual practice but, mainly, it is produced through human interactions framed in dynamics that are not restricted only to the artistic activities⁶⁶. John-Steiner (2000) suggests that there would be four forms of collaboration: distributed, complementary, family, and integrative. The possible confluences of these four categories in different situations are of particular interest to my research. The concept of family connects with that of association as a cooperative connection between people. As such, it pursues the flexible development of common values through the connection and exchange of roles, and mutual trust in the support and sensitivity of each (p. 87). Complementarity is understood as the union of different skills, experiences and knowledge coming from various disciplines.

“For a partnership to be truly creative—to change a discipline and transform a paradigm—multiple perspectives, complementarity in skills and training, and fascination with one’s partners contributions are also essential” (p. 64).

At the same time, it isn’t easy to pinpoint the boundary between what is complementarity and integrative. While for the former “[...] the role of specialized disciplinary knowledge and contrasting modes of thinking [...]” (p. 70) might signify performance practices and means of representation or composition respectively, integrative or generative thinking “[...] is rapid, condensed, and embedded in the cognitive processes of individual(s) who challenge the known” (p. 70). The latter is similar to dialogue, understood as a strategy of translating ideas into the external. The distributive side of creative collaboration rests on the idea of sharing concepts either in a socially organised or casual way: “[...] people participate because of shared interests, but have considerable latitude in the extent of

⁶⁶ Although Vera John-Steiner (2000) has examined specific patterns in artistic collaborations and partnerships such as media, literature, choreography, painting, and music, she has also shown how collaboration works in other domains. Based on small groups, her investigations also encompass areas such as science and philosophy and factors that play and transform results and relationships; gender, generations, communication, language, and emotional aspects, among others.

their joint activity” (p. 113). In such situations, knowledge and decision making are divided between the various roles involved in the work. “In these groups, participants exchange information and explore thoughts and opinions” (p. 198).

4.3 *Eleven fragments* (2016), for violin, viola, cello, and improvising musicians. Interactions between the fixed and the uncertain

The piece was commissioned by the Italian composer and electronic music performer Walter Prati, who led an interesting project on improvisation in which the main musical idea is based on putting together a fixed written instrumental part, and one or more improvising musicians who interact with the written music. In accordance with the original approach, no instruction has been previously set for the improviser(s), so that they can improvise freely. Since it was composed, the piece has been performed five times in different venues and contexts:

1. Premiere: MDI Ensemble (string trio), Evan Parker (soprano saxophone) and Matteo Pennese (cornet) at Teatro Arsenale, Milan, 19th May 2016. (<https://www.youtube.com/watch?v=6mFXeq9cC54>)
2. MDI Ensemble (string trio) and Giancarlo Schiaffini (trombone) at the Teatro Arsenale, Milan, 3rd December 2016. (https://www.youtube.com/watch?v=EZJzYxTS_JM)
3. Taller de Música Contemporánea (string trio), Diego Castro Magas (guitar), and Benjamín Vergara (trumpet) at Centro Gabriela Mistral, Santiago de Chile, November 2016. (<https://www.moralesossio-composer.com/chapter-4>)
4. DriftEnsemble at St Paul’s, Huddersfield, UK, 27th February 2018. (<https://www.youtube.com/watch?v=RtAqRsGoaKM>)
5. DriftEnsemble at Huddersfield Town Hall, UK, 19th November 2018. (<https://www.youtube.com/watch?v=aGlxuxaZf6k&t=368s>)

From a compositional viewpoint, the work is a study conceived through similar OpenMusic methods and principles as *Estudio 1*. However, another step has been added to the process. In *Eleven fragments*, the materials I added into the process have their

must collectively organise their parts according to the instructions in the score. Every single fragment has been written independently for each instrument, however they are organised by specified polyphonic patterns that performers must choose for each fragment.

Beyond technical developments that have been previously explained through the conception of *Estudios automáticos*, *Eleven fragments* involves interesting notions about the relationship between fixed and improvised material. This singular facet of the piece connects with notation. Indeed, the notation of the score already encompasses a certain degree of indeterminacy, as the organisation of events is a matter to be managed by the trio performers. Richard Barrett (2014) defines “[...] musical notation as a medium of (graphic) communication between composer and performer [...]” (p. 61). The second idea of notation that Barrett explores relates to his notion of improvisation as a compositional method, and also how free improvisation can be combined with strictly notated music in the same score. This has been assumed by Barrett as particular gaps within the score invite the performers to improvise, following the guidelines that the notated music indicates. An example to illustrate this kind of relationship is his piece *Island* (2006), for two improvising soloists and instrumental octet. The improvising solo parts can be played by diverse acoustic/electronic instrument or voices. In the eight sections of the score, the octet is conventionally notated, but it is also fragmented into separate parts or sub-groups with entrances and exits managed by the conductor. In fact, it might be said that the conductor plays an improvisatory role as well, since he or she must somehow shape the moment by following textual instructions intended to organise the relationships between improvising musicians and ensemble that Barrett expects to happen. In this respect, the composer’s performance notes in the score point out:

“The intention is that the soloists should be as far as possible unrestricted in their choice of musical material. However, the context of the ensemble should always be born in mind, so that a mutual “influence” between soloists and ensemble is constantly in evidence” (Barrett, 2006).

In my *Eleven fragments*, however, the relationships between soloist(s) and the string trio have not been established by any textual or notational means. The role of the score is only to provide instructions to temporally organise the string trio’s eleven fragments as

events, which are intended to support the structural weight of any randomly occurring kind of relationship with soloists. This means that the task of exploring relationships between participants is up to the performers who can discuss and experiment with it in rehearsals. Decisions can result in completely spontaneous relationship situations as well as more planned situations which engage compositional considerations. It is worth noting that in the two Milan performances (Evan Parker and Matteo Pennese, 2016; and Giancarlo Schiaffini, 2016)⁶⁷ the former situation prevailed. In fact, the two rehearsals were held only by the string trio (mdi ensemble), and the first meeting with improvisers took place in concert, which rather resembled an improvisation match. A similar situation was also experienced in the Chilean version (Diego Castro and Benjamín Vergara, soloists; Taller de Música Contemporánea, string trio).

On the other hand, the DriftEnsemble performances were developed through workshopping. The relationships were set up in such a way that performers suggested different instrumental and gestural configurations with formal implications. In this case, the score worked as a starting point for musical structures, including the ensemble instruments available. Since DriftEnsemble is not a string trio, the version played by them resulted is an arrangement made for violin and recorder. The soloists play the same role in either spontaneous situations or planned-in-rehearsals performances: they should freely improvise, with no prior aesthetical restrictions. Of course, the musical language that the string trio describes may act as a reference framework or even as a constraint for the improvisers, but it is also true that, in previous improvisation, reference materials might be constantly contradicted, in a creative sense.

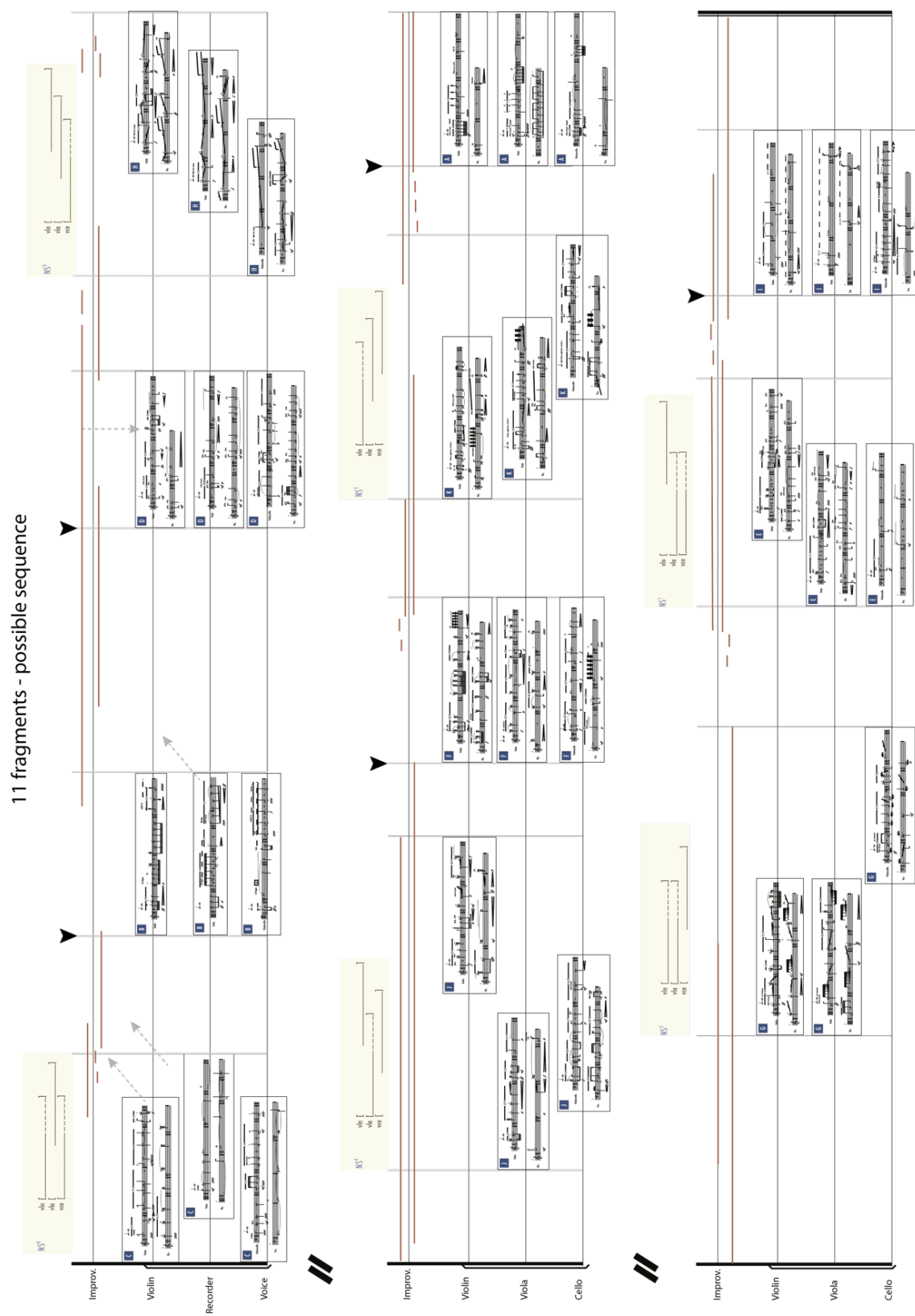
To best understand how the temporal organisation of the string trio materials work, the next illustration (*fig. 4.2*) shows a simulation of the decisions made by the performers in relation to the order that fragments appear in over time. As the score prescribes, there are six non-synchronised fragments (C E G H J K) and five fragments (A B D F I) to be played in a synchronised way, meaning that all three instruments start together in the

⁶⁷ Watch the videos of these versions at https://www.youtube.com/watch?v=EZJzYxTS_JM&feature=emb_logo

same tempo, though they do not have the same metre structure. The temporal organisation is intended to be done by the three performers by following the rules that the score shows. For instance, the musicians must assign a specific polyphonic pattern (six) to each of the six non-synchronised fragments. Finally, there is a chart of eight sequences of eleven fragments, labelled as 'versions' in the score, for the musicians to choose only one of them to play in the concert.

This configuration seems to hold a classical structure, since the string trio could play an introductory role as the opening *tutti* in a concerto before the soloist plays. The fragments of fixed music can eventually offer some gestural references to improvisers in the same way that they could do to the string trio, in a mutual and continuous affectation (see dashed arrows, *fig. 4.2*).

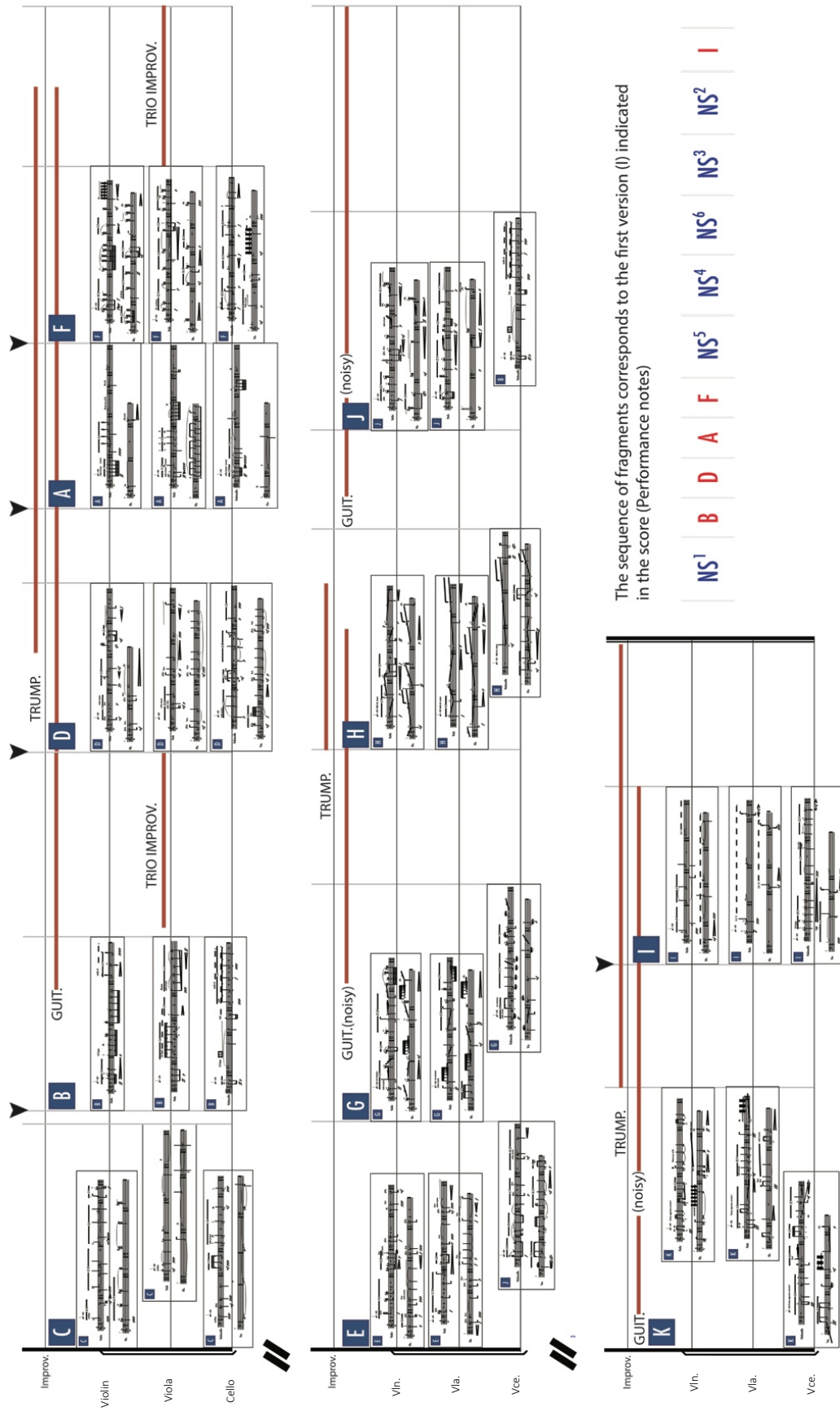
Figure 4.2. Possible structure for Eleven fragments.



As an example of implementation, *figure 4.3* shows the sequence of fragments and general relationship situations of improvising musicians made in the Chilean performance (November 2016).

Figure 4.3. Eleven fragments structure in the Chilean performance.

11 fragments, Chilean performance - November 2016, Santiago



As seen in the above, four synchronised fragments (B – D – A – F) were placed after fragment C (non-synchronised) in the first part of the performance. Curiously, there is no gap between C and B, nor between A and F. Additionally, the two clear improvisatory interventions of the trio were also made in the first part and after the two pairs of fragments with no gaps in between. Another interesting aspect of this version is the fact that in the first part Diego and Benjamin attempted to integrate the texture with complementary elements as soloists, rather than developing divergent features. Contrastingly, their role changed in the second part as the distortion effect on the guitar took place. Diego's decision to add this effect changed the whole landscape of the piece; altering the internal relationships between instruments to give them a more soloistic character.

The premiere in Milan was the longest of the five performances at nearly twenty minutes. What is most remarkable in this version, is the musical presence of Evan Parker and Matteo Pennese. Evan Parker in particular has developed a consistent and very personal musical language through free improvisation, notably so at the very beginning of the piece. Matteo's interventions were increasingly meaningful, setting a balance between the unstable universe of improvisation and the fixed material of the string trio. From my point of view, it is this live performance tension that enriches the interpretation of the piece, leading it into scarce but valuable moments of true symbiosis and mutual identity.

4.3.1 Comparing Italian and Chilean performances

So far, it has been established that the experimental version made with DriftEnsemble is understood as an adaptation of the original material. While the string trio provides timbral and gestural stability typical of this classic conformation, the arrangements made in workshop sessions with DriftEnsemble proliferate the sound universe of the work, further multiplying the types of relationships in all dimensions. These achievements account for the malleability of the guiding idea and show the open criteria to which my materials can be subjected.

However, the two versions performed in Milan (May 2016) and Santiago (November 2016) are most faithful to the idea of opposing a fixed material with free improvisation, and present notable differences between them. Both clearly reveal how tensions worked at the core of interactions between musicians: the prior and in-situ decision-making concerning how the guidelines codifying the performance were assimilated.

The idea of fragments as separable was perhaps assumed with greater emphasis by the Italian performance. The long silences after fragments D, J, and H (see *fig.4.4*) demonstrate a completion intention and a general waiting attitude. I also highlight the sudden attack of the K fragment that could be functionally equivalent to those long gaps, albeit on a smaller scale. Fragment K comes in at 10:30 in the recording, effectively cutting the execution of the work into just two parts. I believe that the general form was understood in five movements of different qualities that regroup the eleven fragments: 1st mov. (F D); 2nd mov. (J); 3rd mov. (G B E); 4th mov. (K C H); 5th mov. (A I). In contrast, the Chilean musicians performed a much less fragmented version. Their decisions aimed to maintain the idea of a more continuous flow, beyond the fragmentation that the piece may suggest. The repetition and development of motifs, the introduction of contrasting elements between the improvisers and the trio, and the decision to slowly introduce the presence of the electric guitar make up the ensemble of actions that made it possible to support this formal idea. The Chilean interpretation also favours the idea of changing states rather than a sequence of sections or movements, as seen in the version made in Italy. However, it is also true that the decisions made by Diego Castro on electric guitar regarding the integration of distorted sounds by the second third of the performance, marks an evident functioning change in which the purpose is to drive the overall texture towards a climax point.

Figure 4.4. Eleven fragments structure in the Italian performance.

11 fragments - Italian performance. May 2016, Milan

The sequence of fragments corresponds to the forth version (IV) indicated in the score (Performance notes)

F D NS⁵ NS³ B NS² NS⁶ NS¹ NS⁴ A I

In analysing both performances, the relationship between the fixed and uncertain that I intended to introduce resulted in two very different perspectives in performance. In my work, this relationship stresses not only the continuous experimentations that musicians have during performances, but also their individual and collective roles. The strong presence of established improvisational languages, such as that of Evan Parker and Matteo Pennese, strains the circular relationship between the performance, material, individual, and collective. In performance, the confrontation between the string trio and a different musical language somehow forces the nature of the fixed material to a permanent adaptation. It contradicts then what "must be played" with the response to the stimuli coming from the improvisers, updating the reception of the form permanently. On the other hand, it seems that the temperament of the improvisers, as well as their contributions to the individual and collective relationships, could either strongly inhibit or stimulate the improvised interventions of the string trio. While the Italian string trio's improvisations were less visible but very precise, the Chilean string trio tried to invent more functional elements, following the spirit of maintaining a living flow of ideas.

Eleven fragments represents my first attempt to start up a multi-relational system, where tensions between fixed or unstable materials behave in circular ways as a natural result of recursion. As in many musical practices, this piece creates a network of relationships that produce their own rules with no regard to my expectations as the composer, or explicit instructions to reach particular results. The need to further explore the possibilities that the tension between fixed and unstable material makes, also generates a self-organising texture that facilitates openness for diverse perspectives by participants. As Pareyon (2011) states, this kind of recursive self-organisation engages a "[...] *coordination* between the fixed or rigids parts of music, with other flexible parts, [...]" (p. 97) which also implies negotiations between particular languages and the environment.

4.4 *Dinámica destructiva* [Destructive dynamic] (2017), for bass clarinet and live electronics

"[...] an autopoietic system is organised as a bounded network of processes of production, transformation and destruction of components which (i) through their interactions and transformations continuously regenerate and realise the network of processes that produced them; (ii) constitute the system as a concrete entity in the space in which the components exist by specifying the topological realisation of the system as such a network".

(Humberto Maturana and Francisco Varela, *Autopoiesis and cognition: The realization of the living*, 1980)

This piece started as a project in 2016 when I met the Italian clarinetist Chiara Percivati. Since then, we have developed a collaborative relationship guided by the idea of creating a piece for bass clarinet and electronics. In our notion of collaborating together we kept the format of our individual roles as composer and performer, intending that experimenting creatively and searching for solutions to specific musical problems should be at the centre of the compositional process. In my role as a composer, my very first impulse was to set up a score intended to act as a shared platform where Chiara's creativity could be fully developed, and my ideas were pervaded by her instrumental imagination. In this respect, one of the first decisions I made was in relation to notational means. Thus, I opted to write a score where:

1. Among several pitch sequences, as well as multiphonics, the pitch material should be chosen by Chiara
2. Rhythm is notated by proportional measures
3. Tempo is free
4. There is a recurrent improvising part
5. Dynamics are not punctual nor specific, but general and changing

However, the modulating aspect of the piece is given by the convergence and combination of the changing elements of these five dimensions of the score, together with a three-layered part controlling three different parameters of the playing to be chosen by the performer. Thus, this complex combination, as a musical challenge, is

actually assumed as a composition for the instrument and the mind of the performer, using the instrument as an extension of themselves: a creative approach using the musician's skills and experimentation of possible outcomes is required. This is a crucial point that unifies a big part of my research; the notion of writing music as a composer and as a performer appears again as a dual perspective in my creative practice.

Dinámica destructiva was premiered by Chiara Percivati and myself (electronics) on 18th June 2019 at St Paul's Hall, Huddersfield.

4.4.1 Form

The piece consists of an introduction and ten sections. The introduction presents a blowing element⁶⁸, providing a significant contrast with the rest of the piece. This appears only in this section, where rhythmic qualities have only been visually suggested. The performer must build their own part by reordering the ten sections referred to as systems. The performance instructions involve physical constraints managed by particular notations that operate on the different components determining the production of sound. Continuous tensions between them should shape extremely fragile sound gestures and allow also variations of timbre, melodic shapes, isolated notes, distortion processes, and so on, at different moments. Formally speaking, the piece articulates the ten sections with very similar behaviours. Each section includes an improvising space reserved for improvisation by interacting with the live-electronic part. These improvisation segments must last between 30 and 70 seconds, to be fixed beforehand by the performer, and may possibly have the material played in the respective section as a reference frame. As a metaphor, it is in the improvisation section of each system that destructive actions occur. The structural energies of the piece pursue a certain organic pattern realised by an active connection between the bass-clarinete and the electronics. The Max/MSP patch managing the whole interactive process includes fragmented recordings from the instrument and modified playback of them; a set of six effects acting over both the instrument and the recordings; and a system of amplitude

⁶⁸ The score instructs to take the mouthpiece out.

and pitch detection. Thus, it is the interactive aspect implemented by such methods that gives the systems a particular mood: before continuing to the improvisation the patch records seven fragments from the playing of the bass-clarinet. Then it randomly plays these fragments back with a system that transforms their sampling rate and concatenates them at a certain speed. This is an accumulative process in dialogue with the clarinet, which is simultaneously being altered by the six effects that appear and disappear at different times.

Once in the improvisation section, the accumulated material is manipulated by a system that includes a feedback filter and a signal degrader which are both interactively controlled by the performer. The louder (or higher or lower) the clarinettist plays the faster and clearer the degradation will be, depending on what configuration has been prepared for each section. At the end of the improvisation, the destroying process leaves a sonic sediment which overlaps with the next section. Finally, it could be said that each section is understood as a particular iteration of a never-ending recursive process.

Since tempo is *ad libitum*, the duration of the piece depends on the decisions that the performer makes about *tempo* in each section. This can vary, on the proviso that the whole piece should last not less than 7 minutes, nor more than 15 minutes⁶⁹.

4.4.2 Notation

The score is notated in two parts; bass-clarinet and live electronics, for one performer (see *fig. 4.5*). The former includes an empty staff in which the performer must place pitches (circles in blue) and multiphonics (in red) from sequences of both elements provided by myself in the score. The aforementioned three-layered part (bass-clarinet) carries different functions that modulate specific parameters that the performer sets up, according to their own explorations with the instrument. In Chiara's case, these parameters were the same throughout the piece, although it is possible to set up different parameters for each section. According to an interview⁷⁰ made in a rehearsal

⁶⁹ However, the recording that I present in my portfolio lasts 23 minutes. This was the first trail that we made in studio.

⁷⁰ VIDEO (<https://youtu.be/ObPRDYXOY9U>)

meeting, the three parameters that Chiara set were: **P1** = air control, articulations, and combinations (vowels, for instance). Sometimes she used the voice as an externalisation of vowels; **P2** = outer body of the instrument (key noises, moving fingers, etc.); **P3** embouchure actions (pressing or releasing lips, actions on the reed, etc.)

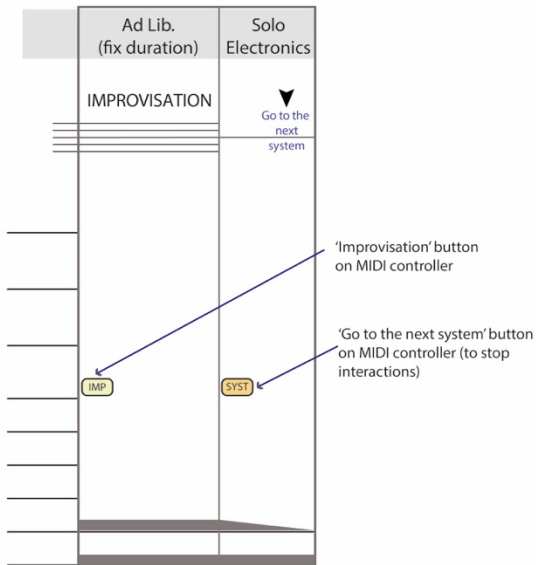
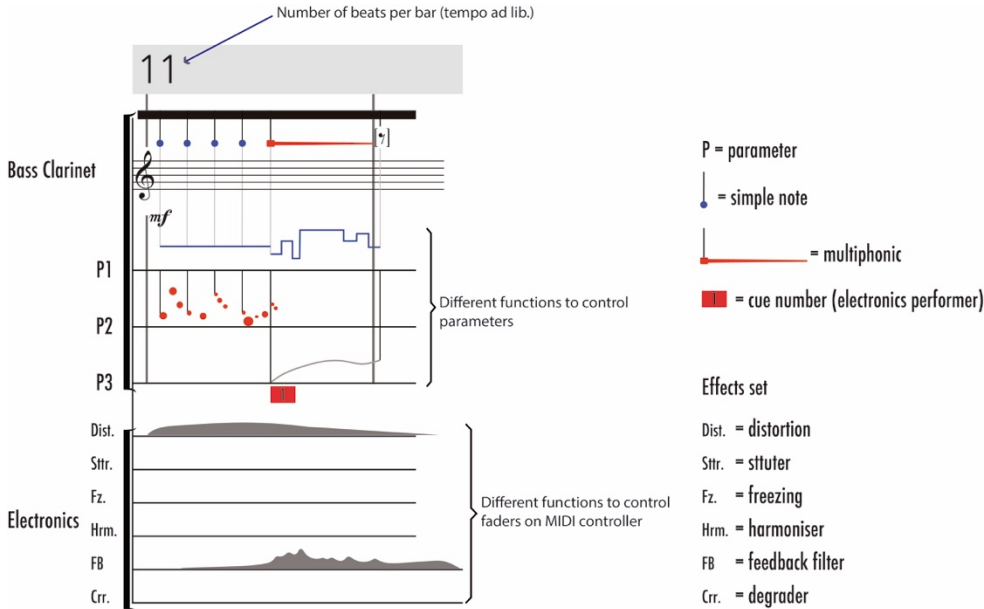


Figure 4.5. Two parts: bass-clarinet and electronics. Improvisation place by the end of each system in Dinámica destructiva.

The electronic part includes a set of six effects, as well as a recording system indicated by the red cue numbers to record fragments, and black/green ■ symbol to play them back. Each effect has its own line where different functions in grey indicate shifts with the faders. These lines also include indications about buttons, knob movements, and button settings. All these actions are managed with a MIDI controller, NanoKontrol. Regarding the amplification system, this requires only a stereo and subwoofer configuration. One or two operators are required to perform both the MIDI controller (faders) and the sound control. In *Dinámica destructiva* the relationship between the bass-clarinete and live-electronics is always the same, though the sounding content changes as a result of specific interactions of the bass-clarinete with the live-electronic part: the latter records different samples from the instrument which are processed and mixed according to an algorithm programmed on Max/MSP. The outcome of this operation becomes a sound layer to be released through the speaker system. Once this layer is built, the performer is asked to define and perform 'cracking' sound gestures (notated as 'IMPROVISATION' in the score), in order to distort or destroy the accumulated sonic construction.

4.4.3 Recursive patterns

As explained above, the form of the piece is characterised by a recursive pattern constructed by interactions between the bass-clarinete and the electronic part. This continuous dynamic form can be summarised as *figure 4.6* shows:



Figure 4.6. Circular dynamic form.

In fact, this model recalls Chilean scientists Humberto Maturana and Francisco Varela's (1980) notion of an autopoietic system (or machine): "An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components [...]" (p. 78–79). According to these scientists, the cycle that elements depict within such a system produces constant evolution, updating the state of every instance of it. At the same time, this structure

creates a unity which may be understood as an operational closure involving a general organisational principle of autonomy (David, 2007, p. 492). German sociologist Niklas Luhmann (1990) contributes with an equivalent vision about the circularity of autopoietic system, pointing out that “Disintegration and reintegration, disordering and ordering require each other, and reproduction comes about only by a recurring integration and reintegration of disintegration and reintegration” (p. 9). These thoughts have been very useful in order to arrive at an understanding of how musical elements emerge from and re-enter the musical flow when performing and creating a piece. In *Dinámica destructiva*, the emergent elements are stored and released in random ways with various modifications. Then, these elements and the actual instrument interact forming another (virtual) layer (which is actually the renewed clarinet-voice): it holds a destroying but generative dialogue with “itself”. The iteration of actions driven by a sense of writing from both the composer and performer’s perspectives, allows the components to reappear again and assume other functions and shapes, according to new contexts, in other cycles of the piece. Additionally, this recursive process takes a similar form within the performer and instrument’s body, as they attempt to organically relate convergent parameters both in the short and long term.

4.5 *Different surfaces* (2017), for female voice, (optional) melodic instrument, and/or electronics.

Originally composed for a workshop carried out by singer Juliet Fraser in February 2017, this piece was born as a solo voice score. The most important *poetic image* came from a lecture given by Aaron Cassidy⁷¹, in the series of seminars entitled *Space as form*. In the first seminar, Cassidy addressed the topic of “deterritorialisation and the Non-Sites”⁷² and provided interesting examples from the visual arts. The first stimulus in the composition of this piece was representing deterritorialisation as a geological phenomenon such as erosion in the voice, so that the form of the piece described a similar process. Since the realisation of this image seems to be intimately related to capabilities of particular performers and considering that I was imagining a flexible interpretation of the piece, I decided to notate it in a way that allowed Juliet to create her own version. The score involves a seven part ‘virtual’ polyphony. Each part is intended to be a surface or container holding material in the process of erosion. After a rich discussion led by Juliet in the seminar, some notational reconsiderations emerged, as well as the image of corrosion as a variation of my idea of erosion. Undoubtedly the score is a fertile territory for further collaborations, since it opens instances of orality as transmission of sounding ideas. The final format of the piece adopted two more instruments (a melodic instrument and/or optional electronics). The piece was finally premiered by DriftEnsemble on 18th June 2019 at St Paul’s Hall, Huddersfield. The performers were Ilona Krawczyk (voice); Paola Muñoz (recorder); and Irine Røsnes (violin). It was also premiered in a shorter version in Tokyo by Duo Mutis (Ayumi Maesato, voice; and Álvaro Zegers, clarinet) on 20th June 2019 at Nonaka Anna Hall, Shibuya.

Form and notation are closely related in *Different surfaces*. The score presents seven staves, each of them representing a particular concept of a surface, which are notated in different ways. Surfaces one, two, and three have melodic patterns, and surface five contains materials acting as a transition between melodic and noisy elements. Surface six holds a set of poetic sentences in English, French, and Spanish, whilst surface seven

⁷¹ Space as Form¹ took place on 7th February 2017 at CAM G/03, University of Huddersfield.

⁷² The concepts Aaron Cassidy referred to were borrowed from various writings by Robert Smithson (1996).

represents a transition between pure text and noisy textures in surface four. This first page of the score constitutes the basis for the other pages that should be arranged by performers following the guidance of the performance notes. The other page of the score is actually a template, on which performers must make cuts in every staff in consecutive square or rectangular shapes, so that they look like open windows. The templates are then superimposed over the main page containing the seven surfaces (S1–S7). Every superposition becomes a new page. Tempo is left intentionally open and unspecified, allowing sufficient flexibility to respond to the notation that appears through the 'open-windows' alongside changes in vocal and instrumental technique. The cuts do not need to include each of the seven strata on each page: their density may range from a single window per page to as many fragments (or as many staves) as desired. Together with these considerations, it is very important to point out that the general form must indicate a clear and gradual process of corrosion, severely affecting every single fragment of material that the open window reveals as much as possible.

In the DriftEnsemble version, each performer arranged their own score individually with no mutual agreement or coordination. The idea was to implement a creative collaborative method where the first step was a personal approach to the piece, before exploring it with the others. The collective process was made by negotiating certain decisions in favour of the group's imagination whenever conflicts of opinion emerged.

Recursion appears as a positive feedback loop in *Different surfaces*. According to several definitions, positive feedback occurs when a minimal disorder in a system results in an increasing general perturbation. Indeed Meadows (1999) points out that "Positive feedback loops are sources of growth, explosion, erosion, and collapse in systems. A system with an unchecked positive loop will ultimately destroy itself. That's why there are so few of them. Usually a negative loop will kick in sooner or later" (p. 11). Indeed, the recurrent action of cutting out several windows across the seven layers implies a sense of repetition in the performance, so the musicians must apply particular corrosive operations every time they deal with a new appearance of the same layer. Performers must operate slowly and progressively upon materials; this implies that the statement of the material must be very clear from the beginning of the piece. Thus, one of the first

decisions that DriftEnsemble made to fulfil this task was to start by playing the melodic layers through windows placed very close to each other. This decision would ensure a high density of fragments when presenting a definition of the material.

5 Visualising new horizons in my work. Final thoughts.

As I have shown, the ensemble of investigations I have developed during my PhD relates to my experience as a composer and, in a complementary dimension, as an improviser. Certainly, these two facets have led me to a broader understanding of my compositional practice. The need to let my imagination dive into abstract operations and the need to keep physical contact with the sounding matter has helped me to progress towards a more specific notion of the role of collaboration in my work. In this sense, the purpose of my research moves away from an individualistic practice of composition. Conceptually, one could imagine that, as a composer, any personal practice with instruments might be sufficient to substitute for performers' involvement. However, the principal motivation in developing the working model I have proposed has been to share a musical writing space understood through the different dimensions that I believe it occurs in. As a result, the 'extended compositional practice' idea has involved an inalienable adoption of creative collaboration activities with others, coupled with my compositional routines.

Nevertheless, it is true that such a coupling usage of collaboration may be problematic when the invention process and imaginative inputs are only considered as unconnected activities. Hayden and Windsor (2007) suggest that there are three types of composer/performer relationships: (1) Directive: when the hierarchical function of the composer completely determines "[...] the performance through the score" (p. 33). Here, the collaboration is "limited to pragmatic issues in realisation [...]" (p. 33); (2) Interactive: although the composer remains the author, the inputs provided by collaborators might be determinant, which can lead to a score with 'open' aspects in terms of performance. (3) Collaborative: the composer as an author is substituted by a "[...] collective decision-making process" (p. 33) and the hierarchy of roles disappears. The outcomes of this type of work do not lead to traditional notation; macro-structure issues are defined by group decisions or algorithmic implementations, for instance. Though standard patterns of composer/performer relationships are still present in my workspace, most of the

collaborations I have practised show unique orientations, methodologies, and aims. As I have shown in this thesis, in my composing work the relationships with performers hold directive, interactive, and collaborative features at the same time. This has implied traditional and non-traditional notation, pragmatic stages for the realisation of the score, interaction by dialogical means, the adoption of collaborators' inputs, collective decisions and improvisation, and the intention to blur conservative hierarchies in terms of the musical imagination's nature. Therefore, the imaginative inputs in my work are strongly linked to each other and, most importantly, to the invention process.

However, beyond considerations of the nature of collaborative work in music, I believe that the principal novelty in developing collaborative strategies in my processes has been to integrate the performer's musical creativity in a recursive compositional process and to bring performative decisions into the musical writing, as they more commonly occur in the moment of performance. As a result, the score of my processes appears as a surface where composer/performer/computer expressions are somehow engraved and reflects how performers have 'written' musical materials on both the human and instrumental body. It is in this path that creative collaborations, a fundamental part of my process, have been effectively incorporated into a whole system of composition that has involved not only a recurrent method but also distinguishable aesthetic consequences. At the centre of such a system, recursion acts as a high-level catalyser whilst interaction between materials and agencies is defined through various specific human, instrumental and mechanical operations. In the 'extended compositional practice' implemented since 2015 in my works, the awareness of how recursive processes work has been essential to defining the communicative bridge between a composer's and performer's creativities. In my works, this catalyser has facilitated and conducted alchemical processes between musical materials generated by both humans and machine, producing transformation. Concerning the aural profile of my pieces, both the precise shape and formal identity that musical materials might adopt can be defined by an interactive dynamic where the composer and performer's actions and results are continuously feeding each other. These creative collaborations are determined by a basic recursive strategy in which the first actions consolidate primary states of musical material, and successive outcomes depend on the structure and gestural content of the previous ones. The aural features of

a piece composed by practising such a dynamic, comes through absorption of released material by the performer's persona, by compositional strategies, and the recursive process of interaction into the collaboration.

After understanding and assimilating the subjectivity and, somehow, the arbitrariness of some concepts and their applications, what I have tried to show in this document and my portfolio is how the notion of recursion, and its different facets, is embedded within my music writing system and the aesthetic consequences that this practice brings. While in *Matters of fact* and *Tragic duet*, for instance, I have attempted to conceive a comprehensive model based on recursion, in *Dinámica destructiva* the term rumbles across diverse metaphoric and physical aspects that appear at the performative dimension: autopoiesis, real-time interactions, recursive dynamics, recurrent instrumental operations, etc. It is at this point that I have tried to introduce the concept of recursion in compositional practices, where musical identities connect to and depend on the subjectivity of the performers, as seen in the second group of works in the portfolio. Overall, my aesthetic results from material and human interactions happening at the core of participatory ways of composing, building meanings distinct from composing alone and producing changing outcomes. Whether or not systemic approaches on recursion have been applied in the invention process, such meanings that emerge from sharing and mutual decisions converge in pieces of music that explore fragments erratically linked, the notion of 'figure' as a form-generating device, asymmetrical forms, improvisation-like behaviours, random syntaxes, tuning instability, are amongst the most important. These profiles would be significantly different in adopting an individualistic approach. For example, the seeming improvisatory features that my music presents might be absent in composing alone; syntaxes would be more carefully delineated; the form would be more clearly sectioned; and so on. In pieces such as *Tacto* and *Elogio de las cosas vacías*, in which the application of the collaborative model I expected to carry out was applied in a less exhaustive way, the instability of the discourse only appears in flashing patterns throughout improvised sections.

Looking at the whole experience of trying to apply a recursive approach to my practice, one of the most important elements to consider for further implementation is the role of

improvisation. Beyond the performative aspect, which has also been developed in my compositions, improvisational practice has been integrated within the compositional process “[...] as a means for expanding the empirical horizon, [...]” (Nono, 1999, p. 174), creating a valuable source of musical material together with its cognitive aspect, “[...] as a path leading to a broader knowledge” (p. 174) on musical material to share with other musicians. On the other hand, I have also applied improvisation in order to facilitate performers to accurately approach musical ideas in more flexible ways, resulting in either trials or activities to shape musical behaviour.

Technologies have played a crucial role in my compositional processes. I have used technologies at pre-compositional and compositional stages together with performance stages (for example, the use of technologies intended for live electronics—Max/MSP 7). However, a wider consideration of these methodologies has allowed me to define the role of technologies at every phase of my creative process. In the pre-compositional stage of recording and editing materials and consolidating musical material through transcriptions, technologies assist the performers to initiate a process of appropriation which implies the embodiment of such material and the musical representation (Mus. Rep.) in OpenMusic to develop compositional processes. *Figure 5.1* shows the types of technologies I have used in both pre-compositional, compositional and performance processes, and also their function at each stage. The pre-compositional stage refers to the process going from experimental actions with registered materials, as well as listening material, to the analysis of content that these materials hold. The compositional stage concerns the musical construction itself. The identical technologies can be used in the performance process but with the main purpose of appropriating every single element emerging from the beginning of the creative process.

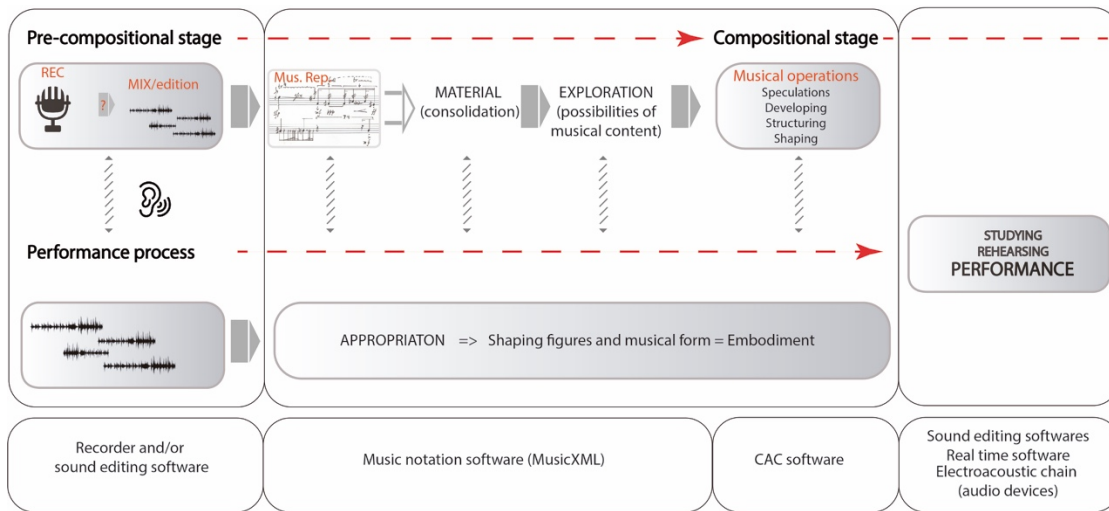


Figure 5.1. Types of technologies in pre-compositional/compositional and performance processes.

Together with the practical side of my process, the role and nature of musical material has been a crucial concept. This has appeared as both a background to and a result of my methods, presenting somewhat variable features. Aiming for a definition requires the consideration of four distinctive/interrelated aspects (see *fig. 5.2*); each of them contribute with different paths and forces in the configuration of the whole.

1. Abstract aspect: speculative/operational workspace.
2. Materiality: notational decisions as sonic representation
3. Physicality: this is the physical existence of the ideas.
4. Metaphoric aspect: stimulating ideas determining behaviours and processes

The combination of aspects at different measures, understood as domains, sets up the geometry of potential definitions:

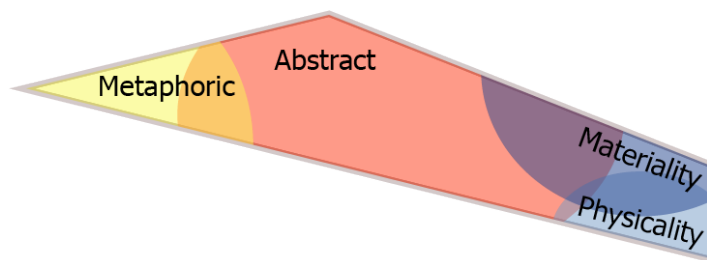


Figure 5.2. Musical material defined by four different domains.

Since I have never considered only one of these dimensions in a hierarchical scale, the starting point of a composition may define the largest angle in my process. For instance, I have often looked at the abstract territory as a self-incitement to imagine potential materiality, which is not necessarily intended as an orchestration but as an embodiment of the sonic representation. Since I consider materiality as involving a certain organicity and complexity, the second stage of the composition also has an analytical side in which I extract the most relevant inner relationships of the embodied structure. Physical properties, in these cases, often work hand in hand with materiality. However, it is true that this is not always an aspect that I am interested in formalising in compositional terms, since physical qualities could require more flexibility and fewer notational constraints to exist. The whole process is also mediated by metaphoric ideas appearing in the pre-compositional stage that can potentially create significant shifting in my approaches. It is only in the last stage of the process that I make decisions involving notation. As seen, my abstract speculations developed in the operative space can be not considered as a determining factor to carry out creative collaborations and performances. This has come from particular musical ideas under the form of either well-delineated pre-composed figures or verbal/notational instructions and suggestions.

Recursion is a widespread concept that emerges from different disciplines and epistemological approaches. In my work, the shifts in the understanding of the term have certainly been important, providing me with the 'geographical' coordinates where my compositional actions move, and indicating which elements interact within them. But the conceptual frameworks that I have tried to shape in my pieces over the last four years are only a momentary period in a more extensive development with diverse facets. The recursive approach could allow me to progress deeper into practices where improvisation simultaneously acts as a generative compositional tool and as a performative strategy, similar to my explorations in *Viaje al cielo de Occidente*, for instance. Those improvisations could also be recursive between each instance, since they may mutually refer to one other, therefore producing a constant updating of material and developing tension between the fixed and the uncertain. Improvisations in performance might refer to transcribed improvisations and musical operations made by performers as fixed

material, in a path where the fixed material is updated by shifting contexts ruled by uncertainty.

Another aspect that I would like to develop in future is working with larger groups of performers. Ideally, this would require working conditions such as an artistic residency where time and space for experimentation are provided. But beyond this 'institutional' aspect, I could test my model within more complex social situations such as bigger ensembles or multidisciplinary collaborative groups, where the compositional process is altered in its operational stage, resulting in more collective decisions and negotiations.

From the technological point of view, I think that a pending task is to upgrade relationships between machines and performer(s) in the compositional stage. So far, my computational implementations can only be used by myself since I have not programmed a compact code and suitable interfaces allowing for more widespread interaction. In my original idea the presence of the computer as a form of music-representation means that it interacts with both performer(s) and me as a composer. The idea of an extended compositional workspace could achieve a more major development if my computational tools allowed for human participants to interact with the machine both collectively and individually. Of course, this idea opens other domains for development such as integrating new models of interdisciplinarity that experiment with different materialities and artistic practices.

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